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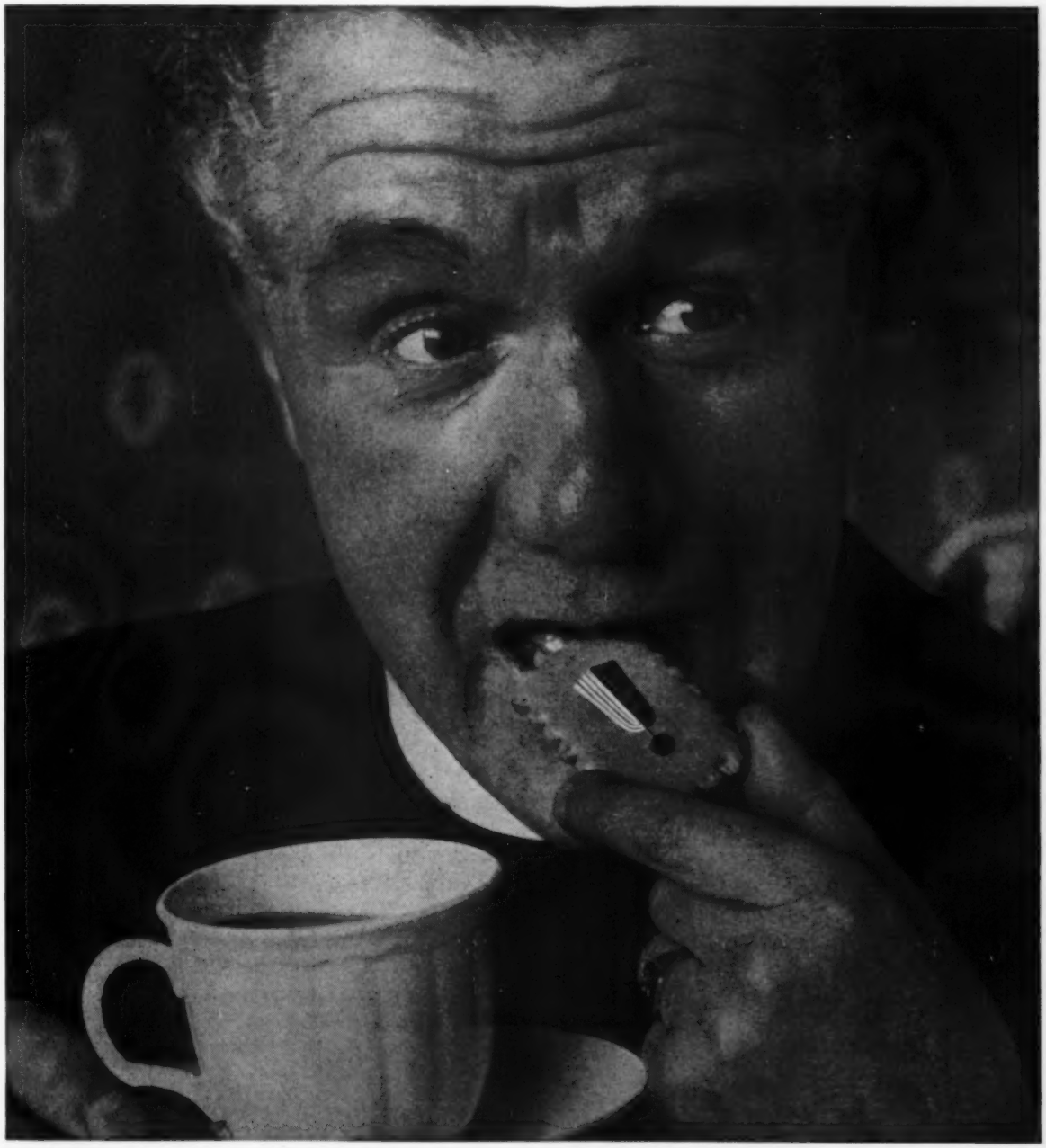

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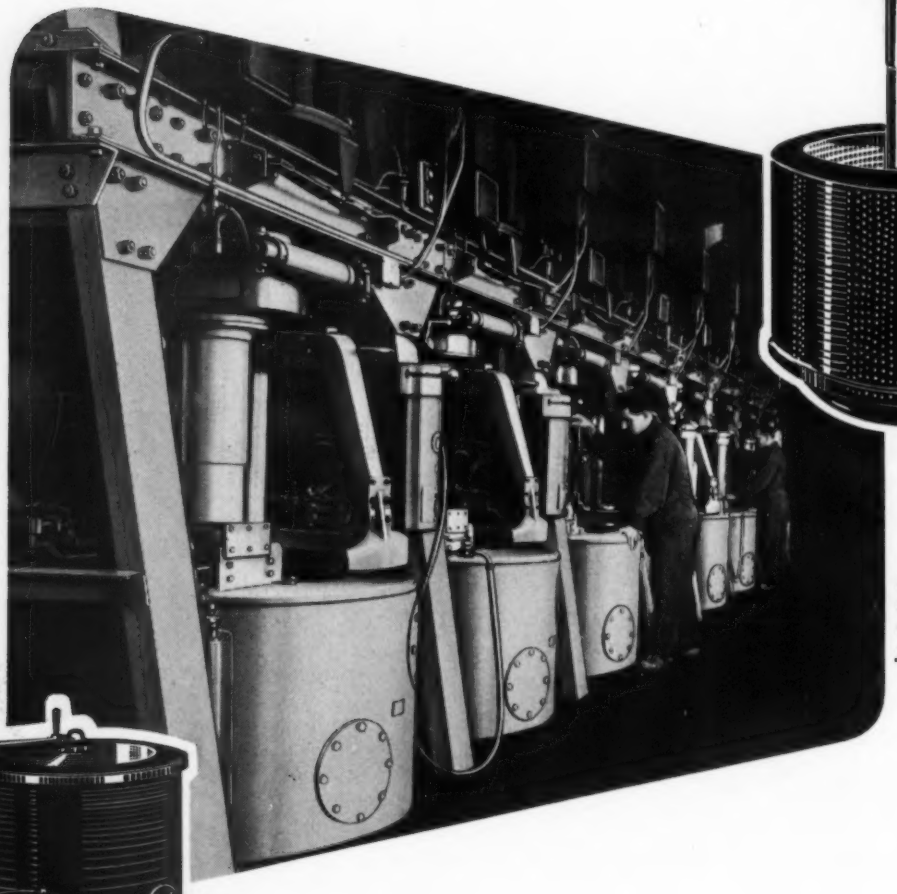

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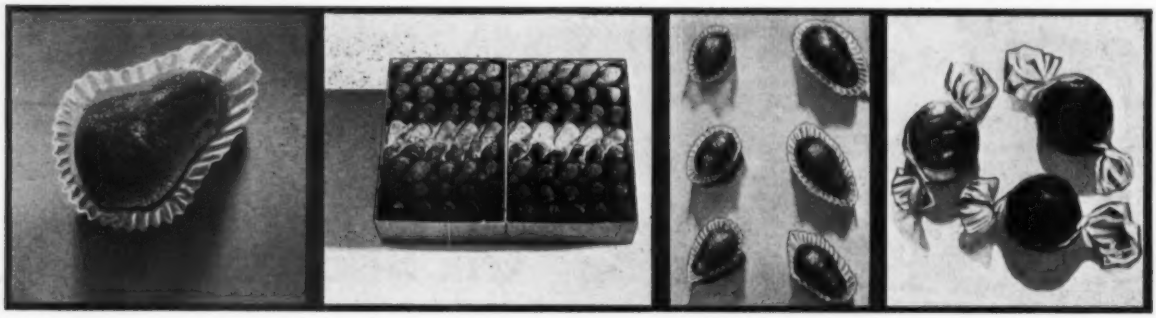

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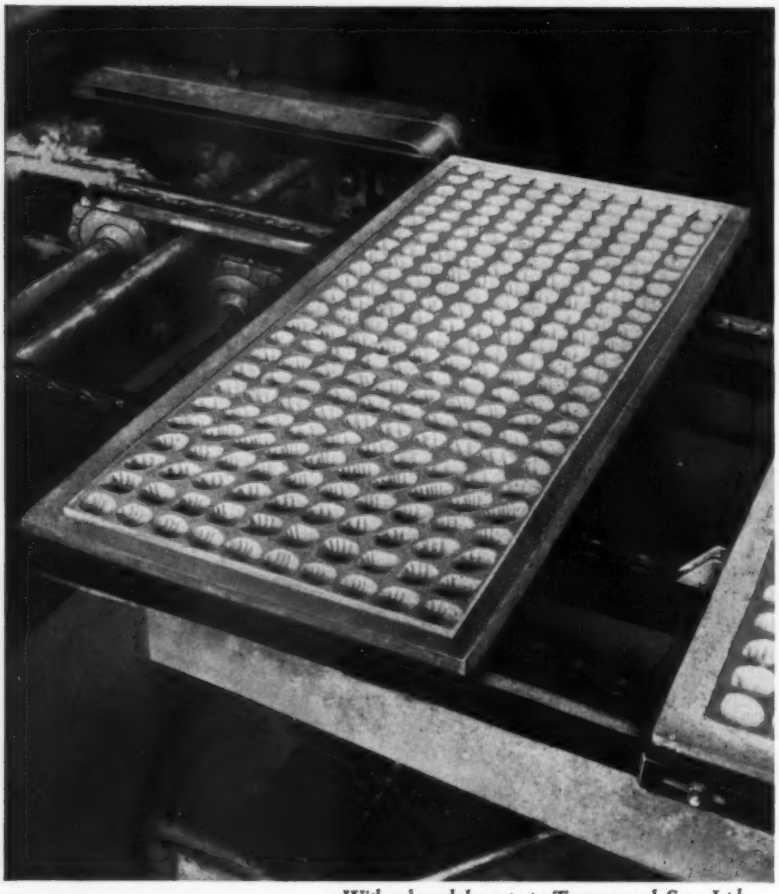

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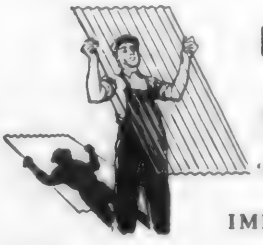

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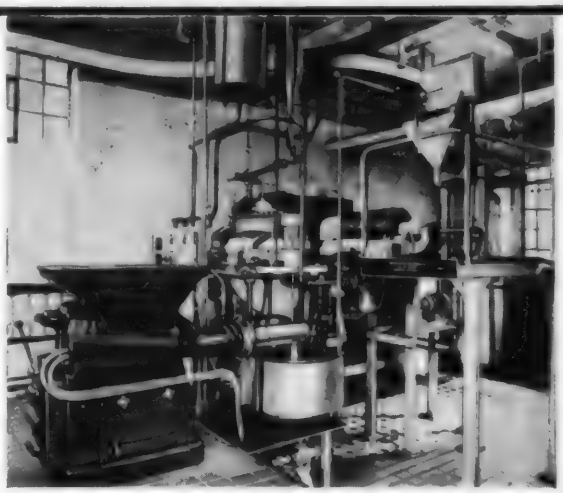

DEPENDABLE DE LAVAL CENTRIFUGAL SPECIALISTS FOR OVER 75 YEARS

For economical heating and cooling of Animal Fats use **DE LAVAL** Plate Heat Exchangers, and for pumping use **DE LAVAL** Easy-Clean Stainless Steel Pumps

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SAVE YOUR BACON with

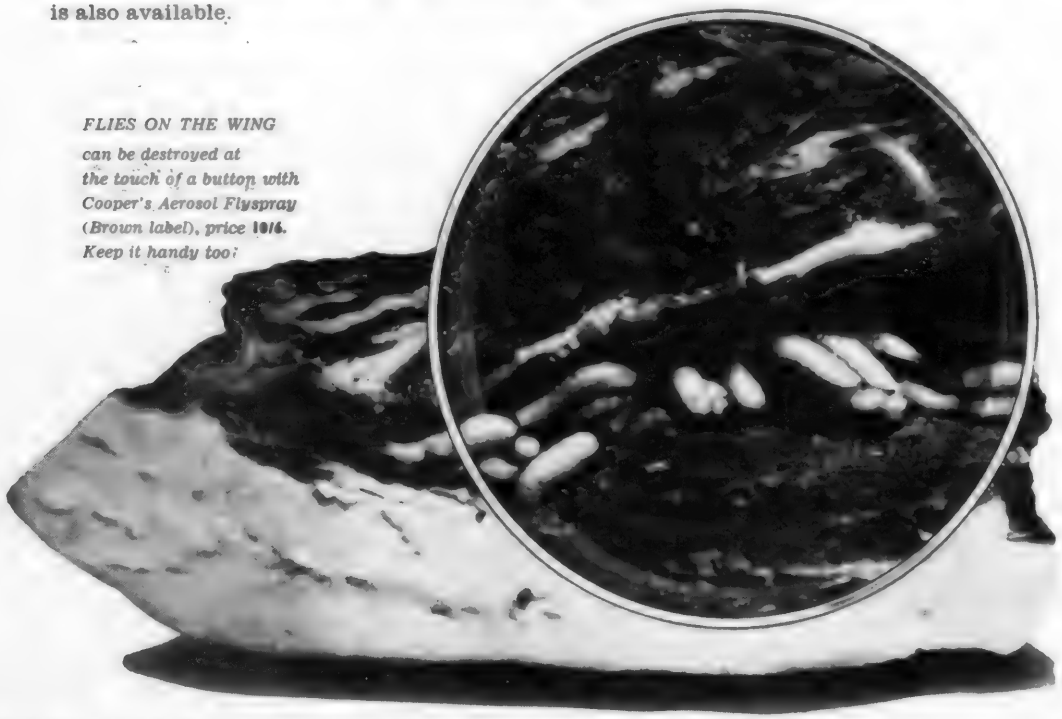
PYBUTHRIN

(REGISTERED TRADE MARK)

BACON PROTECTANT

You can save so much, at so little cost, with " Pybuthrin " Bacon Protectant ! Dusted on sides of bacon and hams, it protects them more effectively against blowflies and similar pests than has ever been possible before. " Pybuthrin " Bacon Protectant contains African pyrethrum synergised with piperonyl butoxide, and is non-poisonous and non-tainting. Leading bacon curers confirm its effectiveness. Write for current prices of puffer-packs, 7-lb. tins and 56-lb. drums. A special Powder Applicator is also available.

FLIES ON THE WING
can be destroyed at the touch of a button with Cooper's Aerosol Flyspray (Brown label), price **10/6.**
Keep it handy too!



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GRAVITY OPENING LOUVRES
FUSIBLE LINK.
STAINLESS STEEL TENSION SPRING, KEEPS LOUVRES CLOSED WHEN NOT IN USE.
LOUVRE OPENING SPRING.
CABLE CONTROL PULLEY FOR NORMAL VENTILATION USE OR FOR TEST OPERATION.

with the COLT DUAL PURPOSE FIRE VENTILATOR

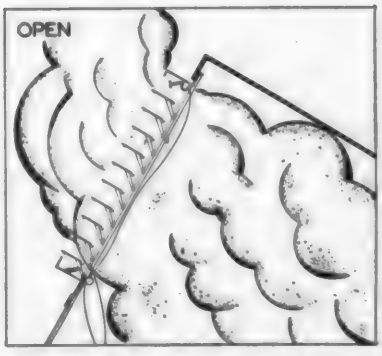
at AC-Delco, Division of General Motors Ltd., Southampton.

A study of industrial fires in Great Britain and in America has shown that the primary cause for the spread of fire is the super-heated air, smoke and explosive gases trapped under the roof. They build up in heat and intensity from the fire below and cause flash fires. Furthermore, the smoke rapidly extends downwards, entirely filling the premises and preventing the work of the fire fighters.

Colt have successfully solved this problem with the design of the Dual Purpose Fire Ventilator which **provides ventilation during normal conditions and—in the event of fire—functions as a heat and smoke exhaust.**

The installation of heat and smoke exhausts is standard practice in America and is rapidly being adopted by leading industrialists in the United Kingdom. Already, 1,290 Colt Dual Purpose Fire Ventilators have been installed in General Motors buildings in this country.

Write to Dept. V.9/7 for paper " Some Aspects of Fire Prevention in Industrial Buildings " by M. J. Reaney, which deals fully with this matter.



The insets illustrate the action of the ventilator as a Heat and Smoke Exhaust. In the event of fire, the fusible link fuses, providing Automatic Escape for Super-Heated Air and Smoke.

COLT VENTILATION

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U.S.A. Subsidiary: Colt Ventilation of America Inc., Los Angeles.

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USING CROFTS AIRFLEX CLUTCHES & BRAKES

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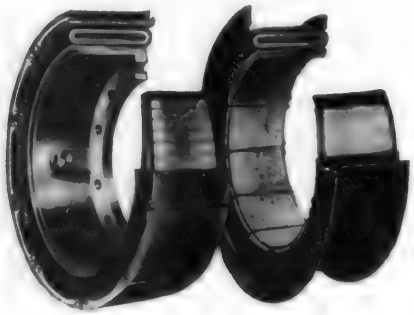

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- ★ **sensitive, finger-tip control of powers from fractional upwards**
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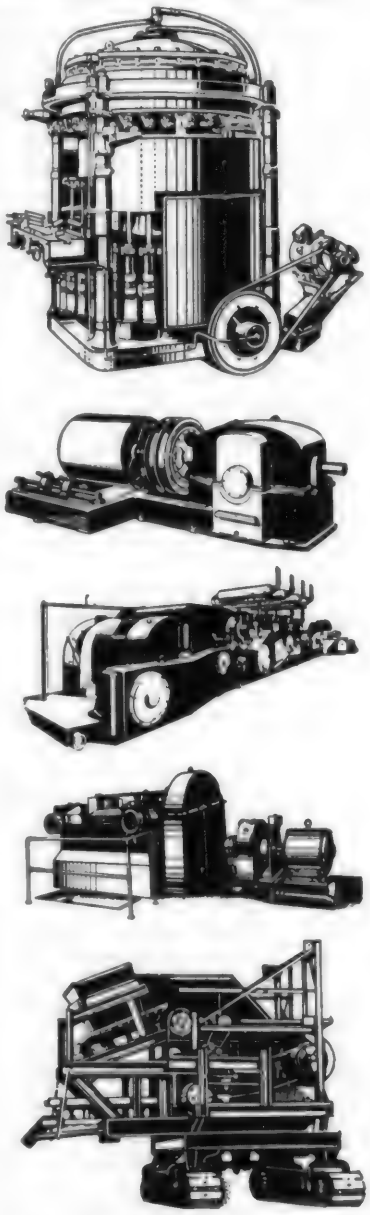
- ★ **no adjustment needed, so no loss of production time**



Ideal applications of Airflex on right show (top to bottom): bottle filling machines, paper machinery, oilfield machinery, rubber mills and stone breakers—to mention but a few.

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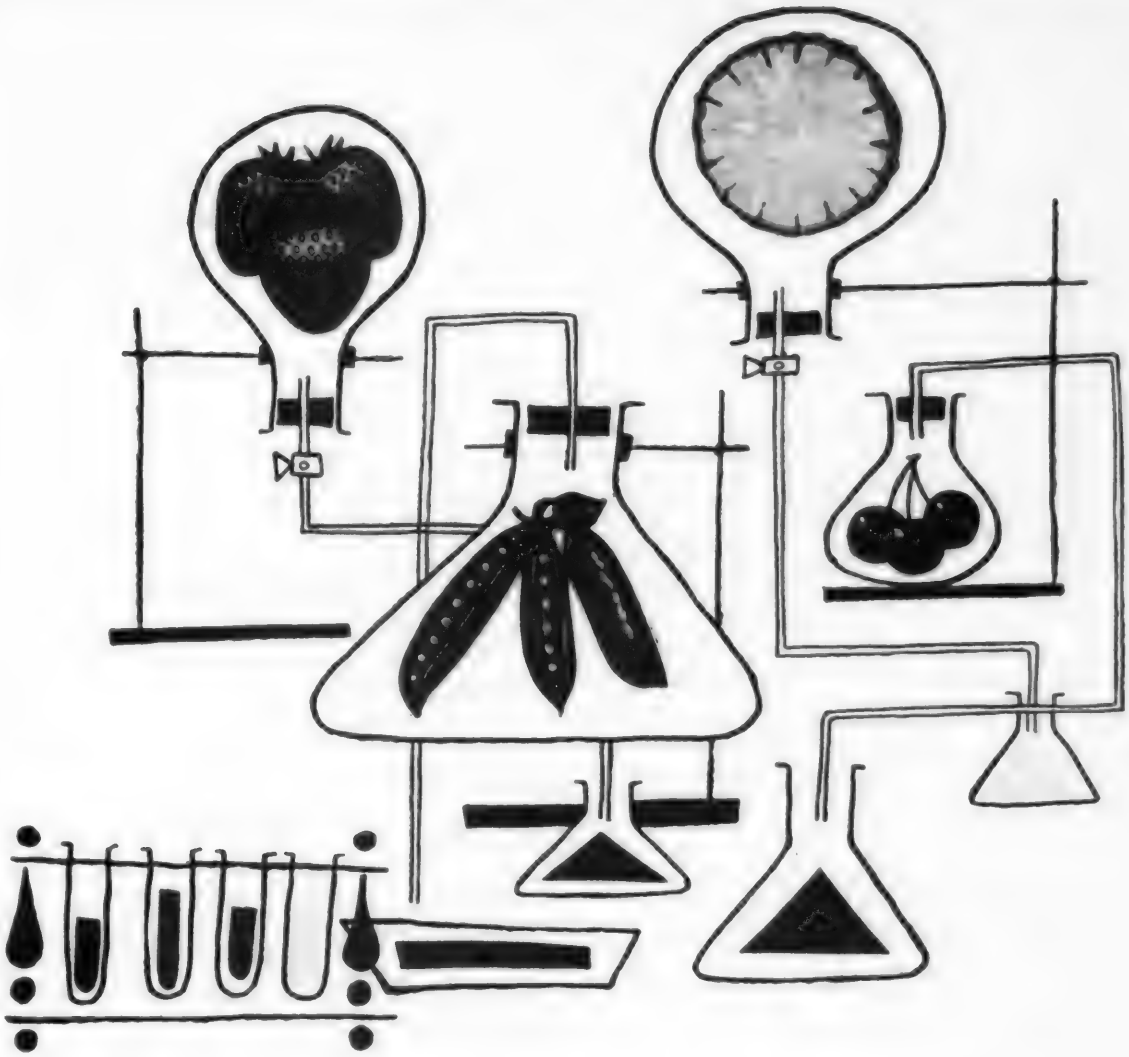

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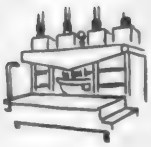
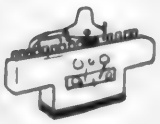
FOR FOOD PLANT

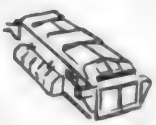


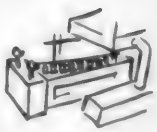
in the Jam Factory



JARS IN

CAPS IN





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This *Dawson* washing machine does 25 men's work

It washes all the utensils used at the Stratford factory of Excel Ltd. for the manufacture of their Sausages and Pies. Other Dawson washing plant is in daily operation in all branches of the Food Manufacturing Industry.

London's largest washing-up machine

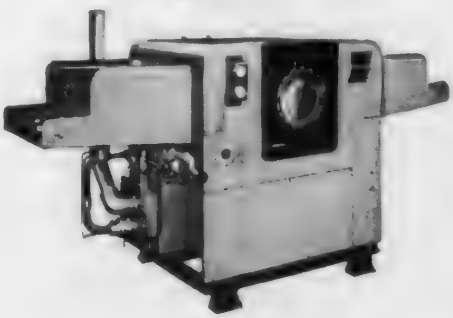
A giant washing-up machine has just been installed at the Stratford factory of Excel Limited, the well-known manufacturers of sausages and pies.

This machine is one of the first to be installed in a sausage factory and grew from an idea of members of the Company's staff, who were impressed by the efficiency of the washing-up machine in the factory's canteen.

As a result all the utensils in general use were sent to the firm who made the Dishwashing Machine with a request that they build a machine to wash them all.

Mr. E. E. Burrage, M.I.Mar.E., chief engineer at Excel's Stratford factory, and the man who had the responsibility for the machine's installation, describes the machine as "one hundred per cent. efficient."

Previously 25 men were engaged laboriously scrubbing hundreds of trays and moulds, a job which the machine now takes in its stride.



AUTOMATIC BAKERS' TRAY WASHING & RINSING MACHINE

Handles trays up to 24 in. wide. Heating—Steam, Gas or Electric. This is our smallest machine occupying only 9 ft. by 3 ft.

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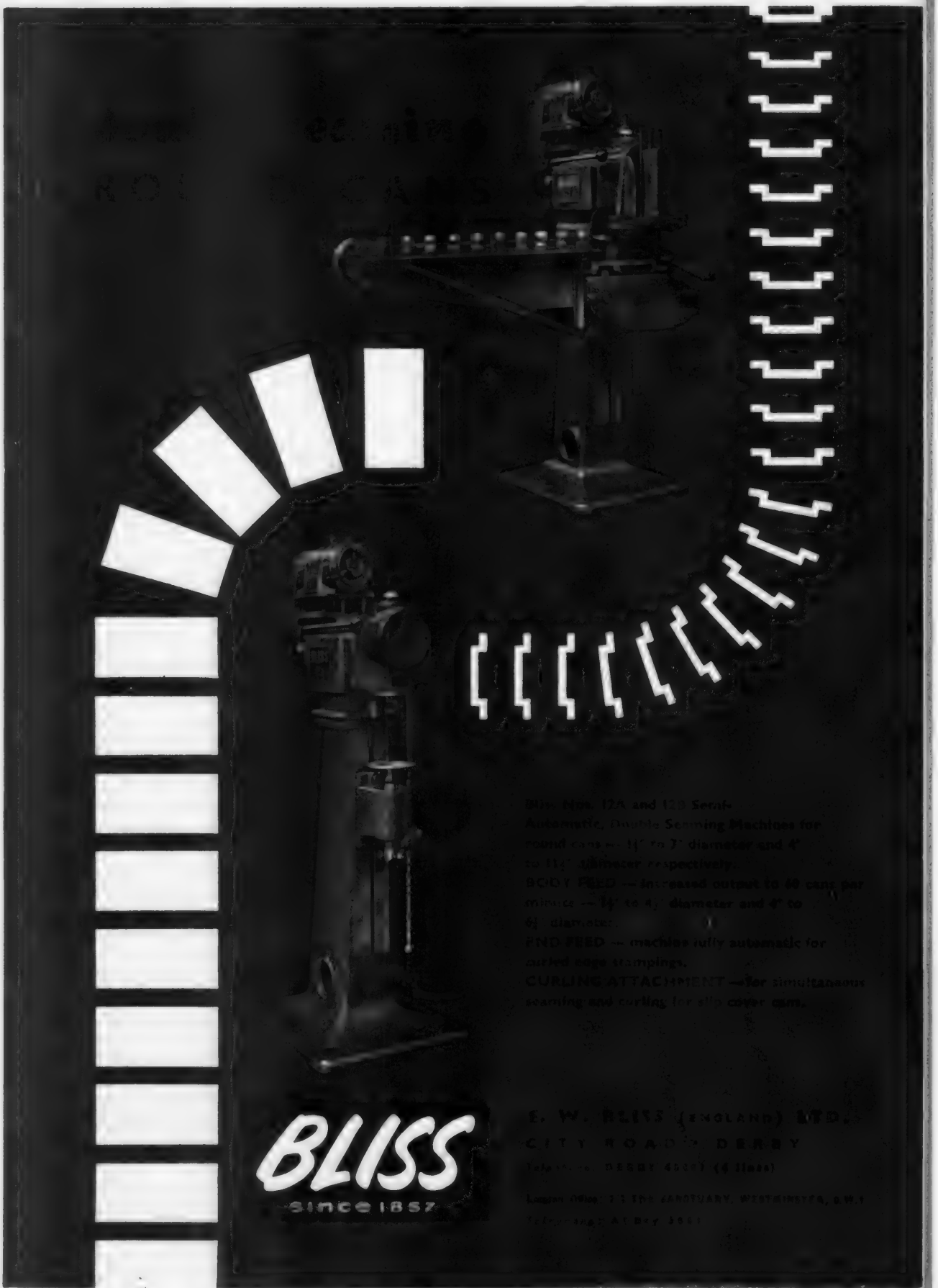
London Works: Roding Lane South, Woodford Green, Essex. Tel.: Wanstead 7777 (4 lines)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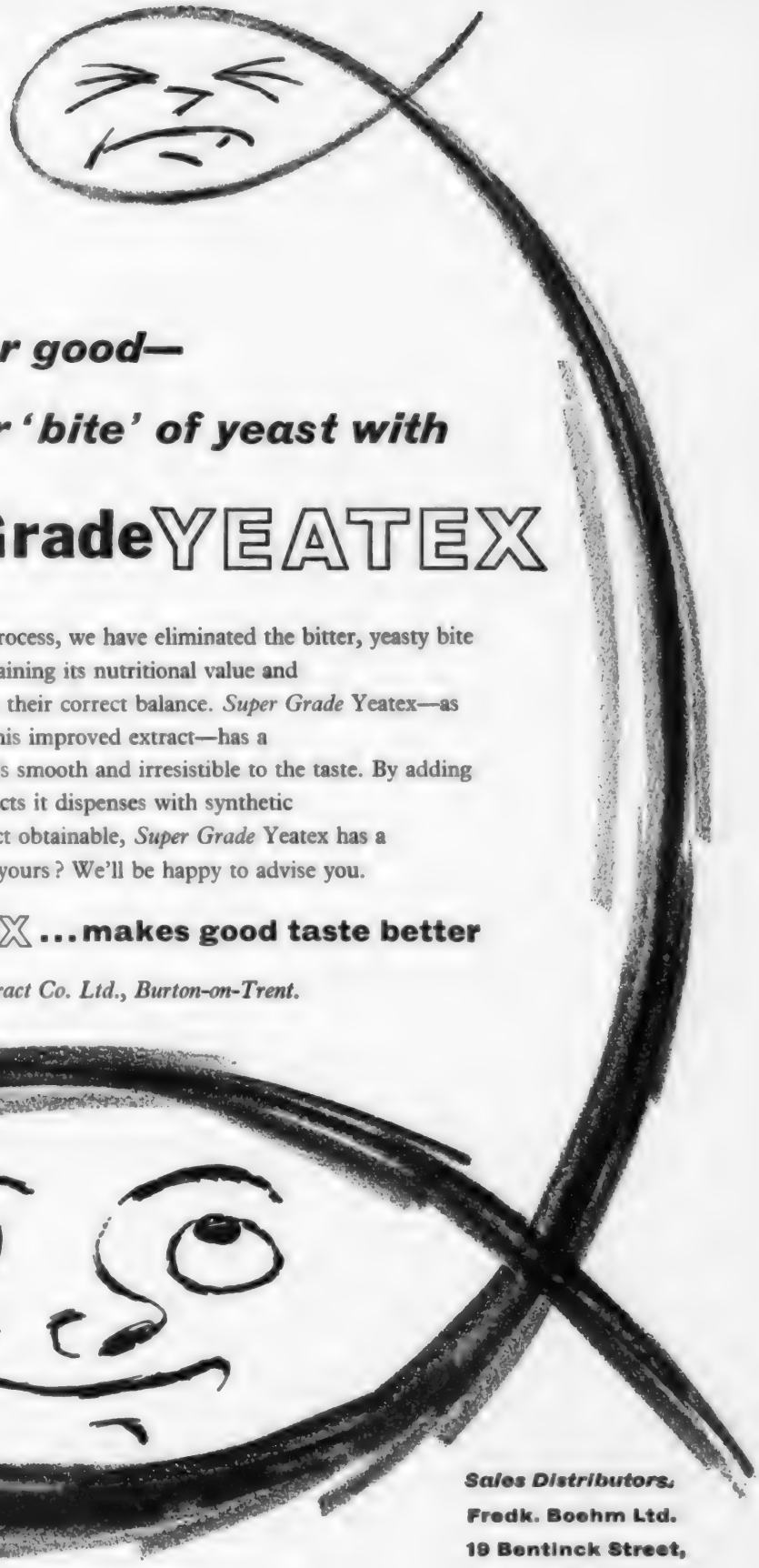
since 1857



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the bitter 'bite' of yeast with

Super Grade YEATEX

Using a new de-bittering process, we have eliminated the bitter, yeasty bite from yeast extract whilst retaining its nutritional value and vitamins of the B Complex in their correct balance. *Super Grade* Yeatex—as we have very properly called this improved extract—has a delicate aroma and flavour and is smooth and irresistible to the taste. By adding a subtle piquancy to many products it dispenses with synthetic flavourings. The finest yeast extract obtainable, *Super Grade* Yeatex has a place in many foods. Has it one in yours? We'll be happy to advise you.

Super Grade YEATEX ... makes good taste better

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Do you want to lag behind? You wouldn't say so—but that's what you're doing if you don't use Golden Glow for your bulk milk needs. Golden Glow is just like milk—but it's easier to store, easier to handle and keeps much longer. And for bulk users it's certainly much more economical.

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SEPARATED MILK POWDER Spray and Roller process	28-lb tins, lever lid 28-lb and 56-lb waxed bags polythene-lined

GOLDEN GLOW for all your needs

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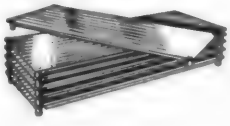
The CHIEF ENGINEER says—

'Vermin and Dirt are excluded by WARCO easy-to-handle



Stacking Bowls'

An extremely robust container of 16" diameter × 8½" or 12" or 15½" deep—5, 7½ or 10 gallons capacity respectively. Manufactured from 10 gauge aluminium with drop down, or fixed, side handles and stacking feature. Used in a wide variety of trades for the conveying or storage of all kinds of wet or dry foods. All sizes interstack and lids can also be provided.

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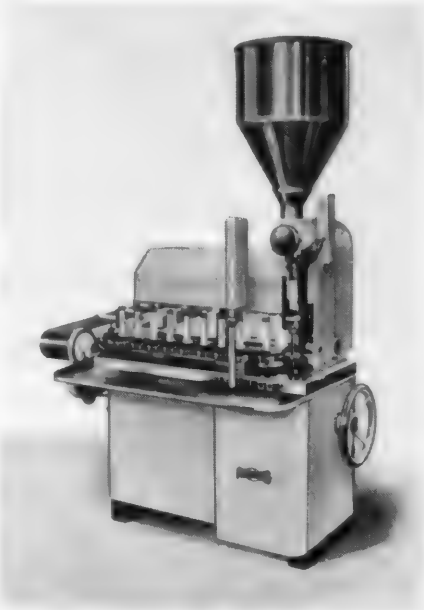
There is every indication that this convenient method of packing food preparations will expand rapidly.

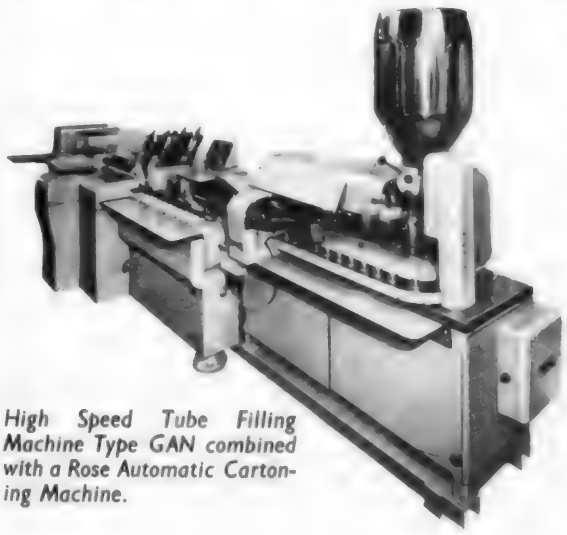
The qualities of the ARENCO TUBE FILLING MACHINES are well known in all industries where hygienic conditions are essential.

All parts coming into contact with the material are manufactured in stainless steel, and the design of the pump valve greatly facilitates removal for cleaning and other purposes.



Standard Model GAB

OVER 150 MACHINES ARE NOW OPERATING IN THE U.K., AND MORE THAN 600 ARE INSTALLED IN FACTORIES THROUGHOUT THE WORLD



High Speed Tube Filling Machine Type GAN combined with a Rose Automatic Cartoning Machine.

- Progressive filling with complete freedom from air pockets.
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- Tube cleaning Device.

and many other special features

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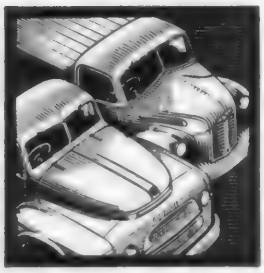

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MORE DEPENDABLE - MORE DURABLE

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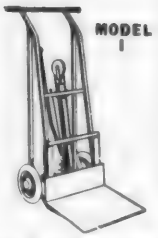
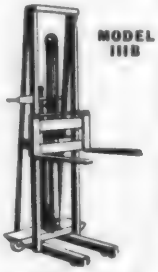


MODEL I

LIFTS 2½ CWT. TO 3' 1½"

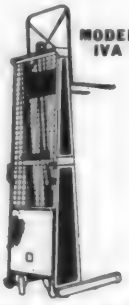
MODEL IA

LIFTS 3 CWT. TO 3' 8"



MODEL IIIB

LIFTS 7 CWT. TO 5'



MODEL IVA

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MODEL V

TRANSPORTS 6 CWT.

TUG & WHEELED PALLET

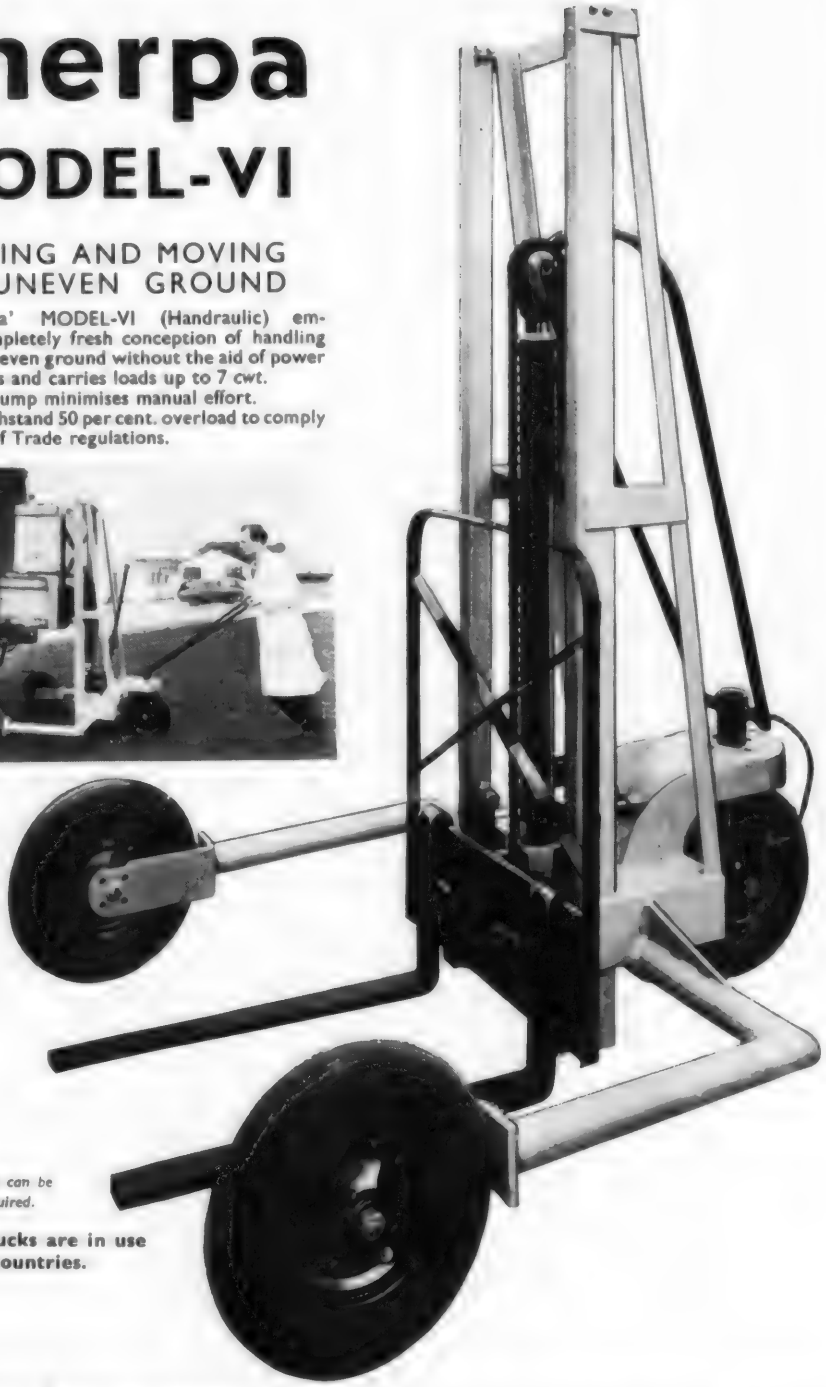
CARRIES 10 CWT.

it's new!

the Sherpa MODEL-VI

for LIFTING AND MOVING OVER UNEVEN GROUND

The 'Sherpa' MODEL-VI (Handraulic) embodies a completely fresh conception of handling loads over uneven ground without the aid of power traction—lifts and carries loads up to 7 cwt.
Dual speed pump minimises manual effort.
Tested to withstand 50 per cent. overload to comply with Board of Trade regulations.



Deferred terms can be arranged if required.

'Sherpa' Trucks are in use in 33 countries.

Inquiries for literature and demonstration to Dept. F.M.

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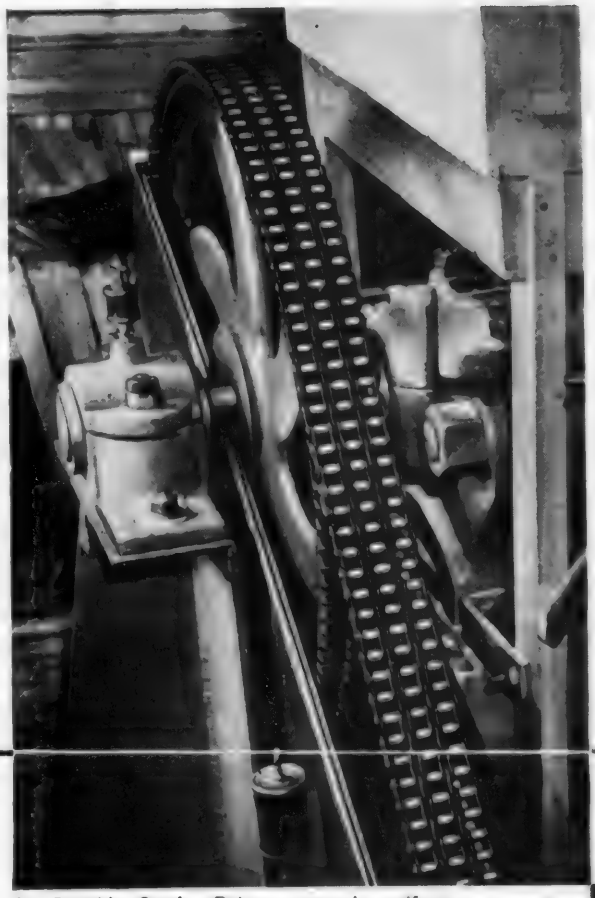

A Renold Stock Drive ensured uniform extrusion on this macaroni press. When flat belts were used considerable trouble was experienced through slip.

For conversions or new equipment specify **RENOLD stock chain drives.** Quiet, positive and smooth running, they will give you years of dependable, trouble-free service, outlasting other types of transmission many times.

Drives from fractional to 140 h.p. can be supplied **FROM STOCK** in 25 different ratios, easily selected from chart in our Catalogue Ref. 116/93

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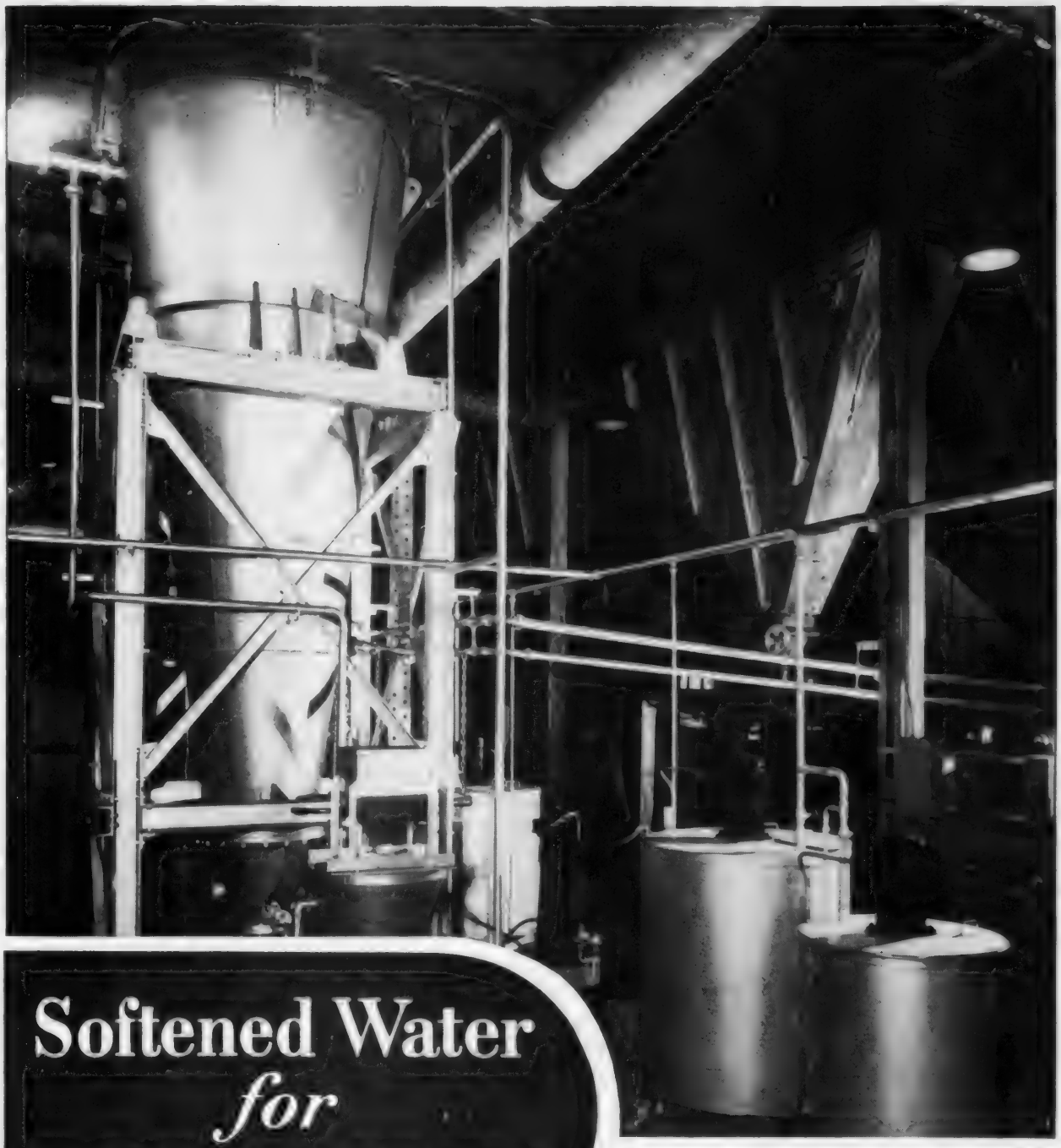

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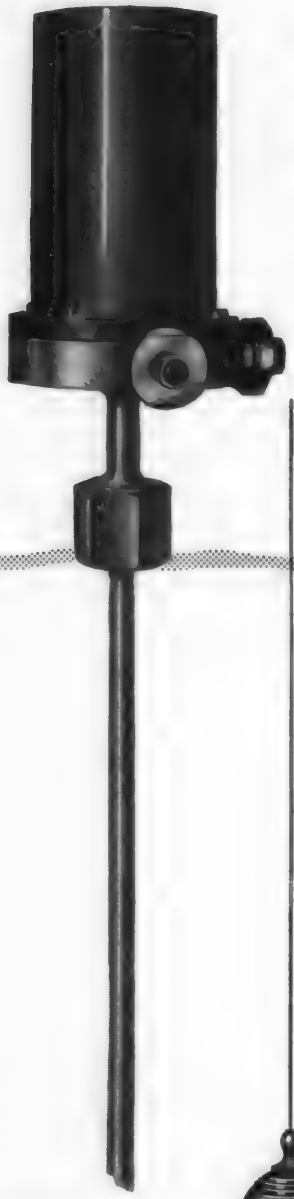

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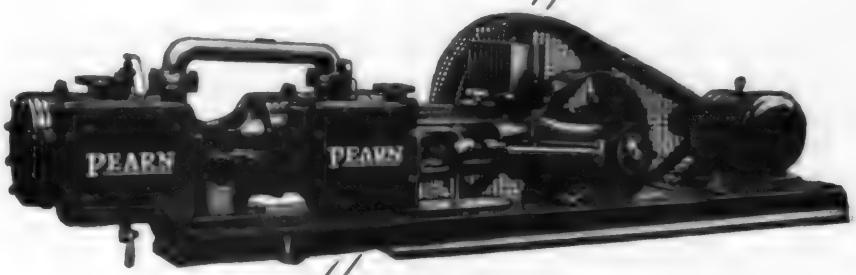

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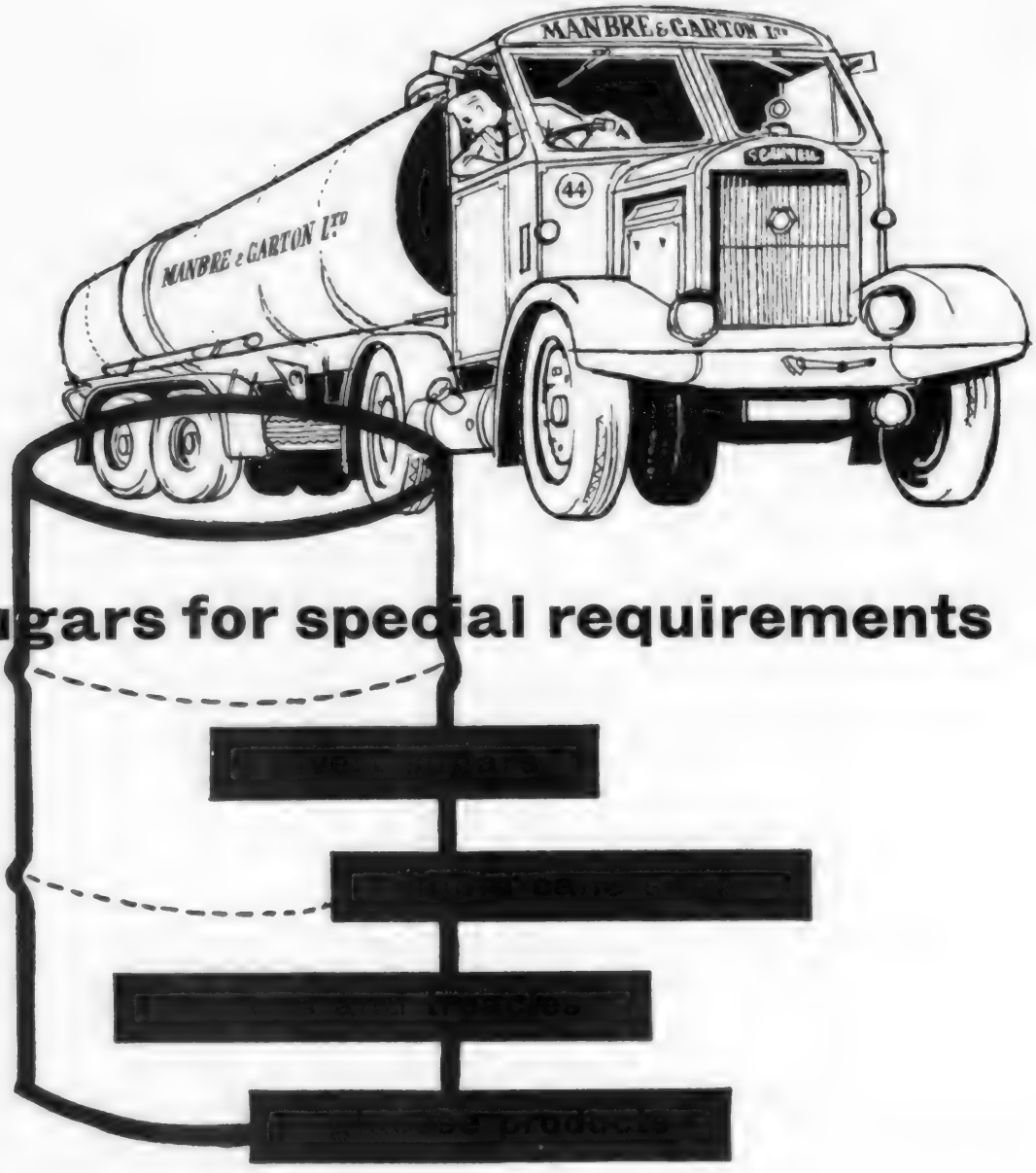

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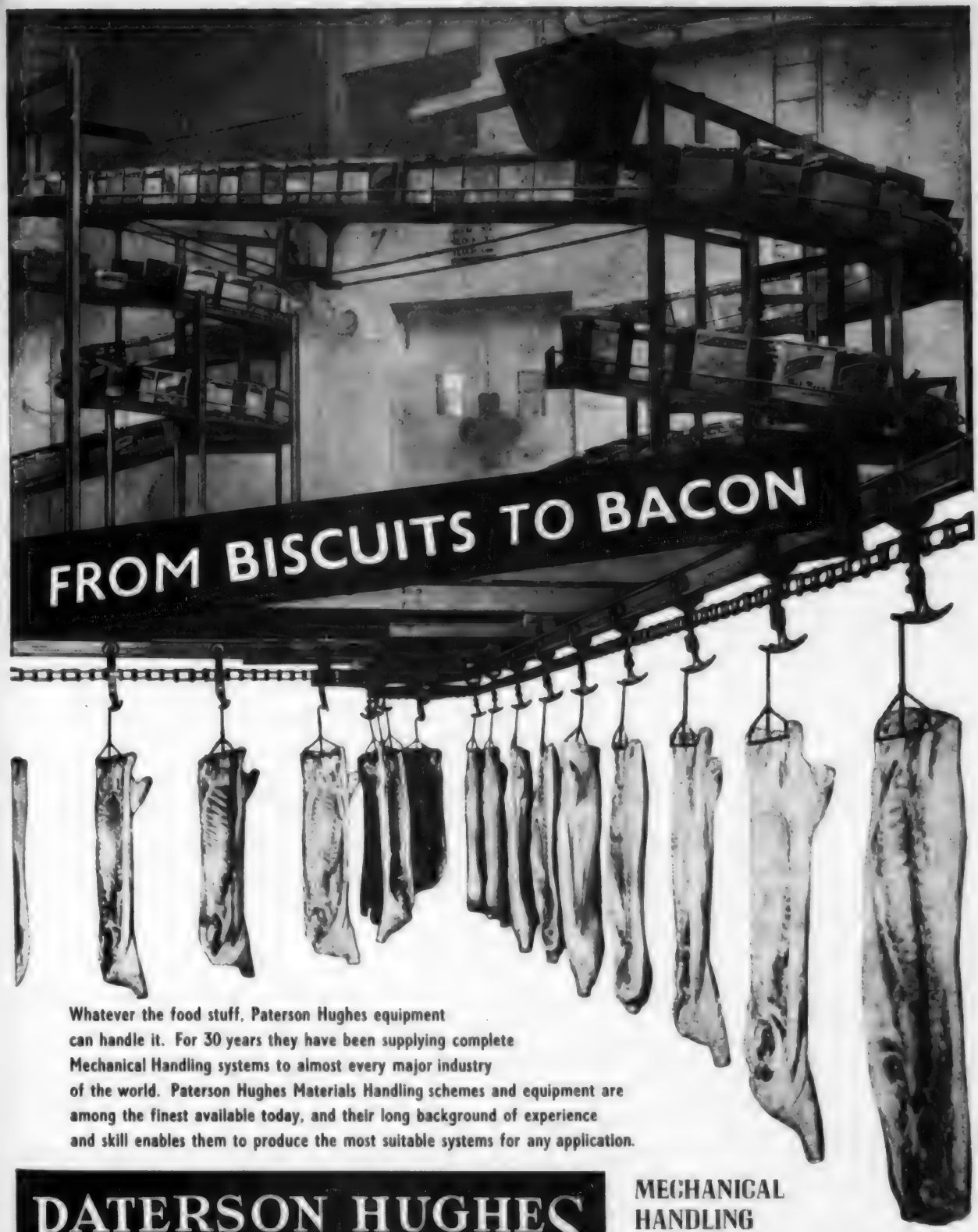

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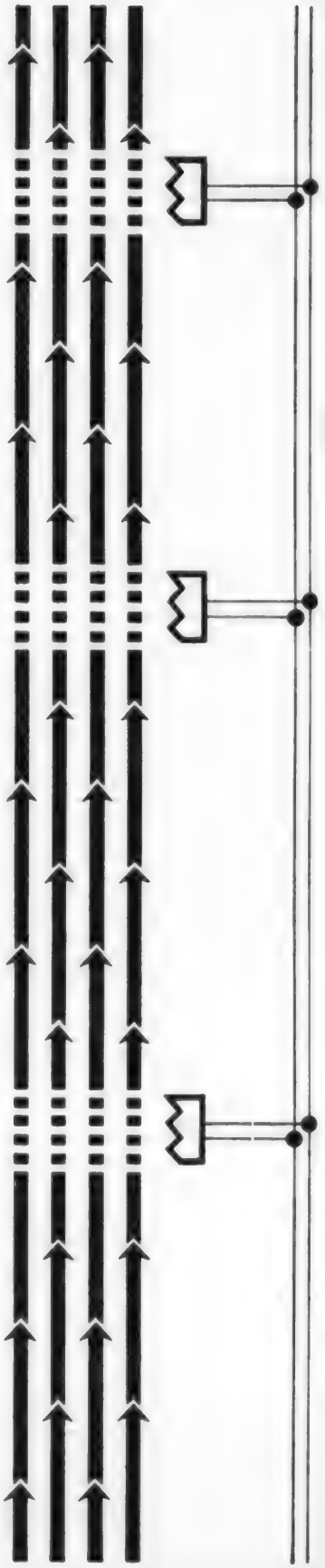

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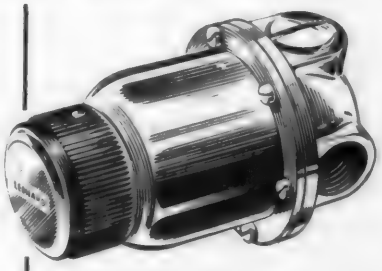

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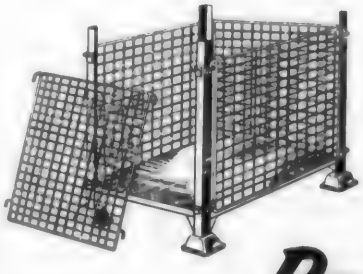

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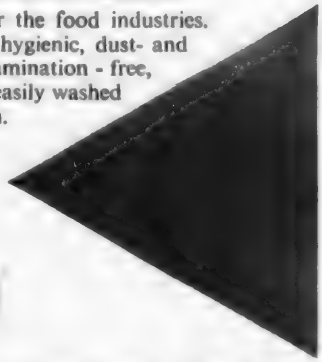

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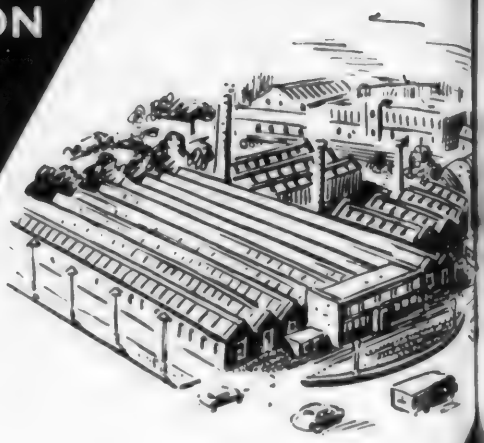

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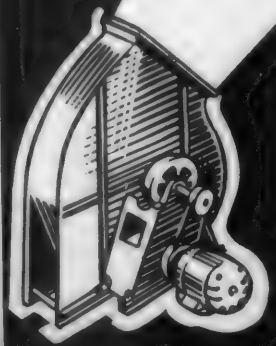

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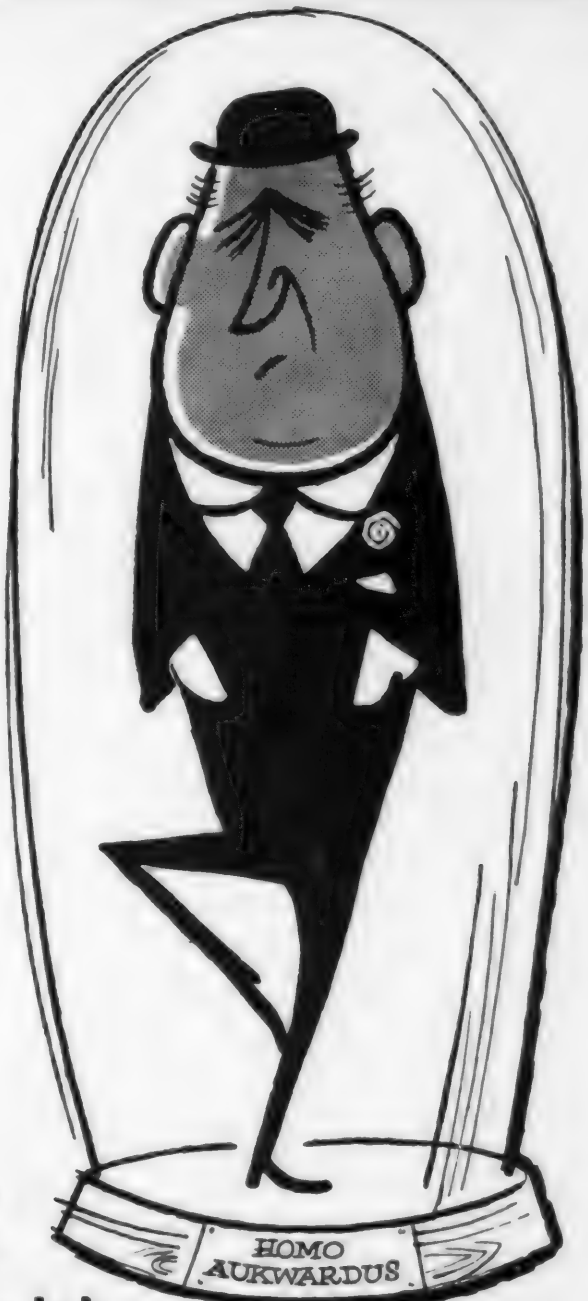

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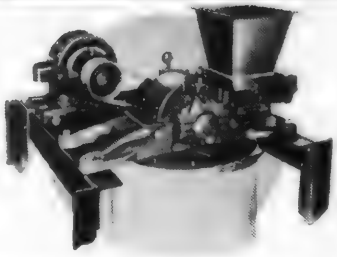

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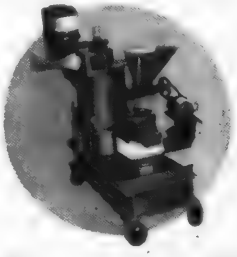

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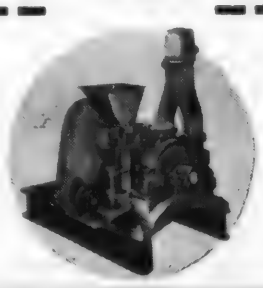

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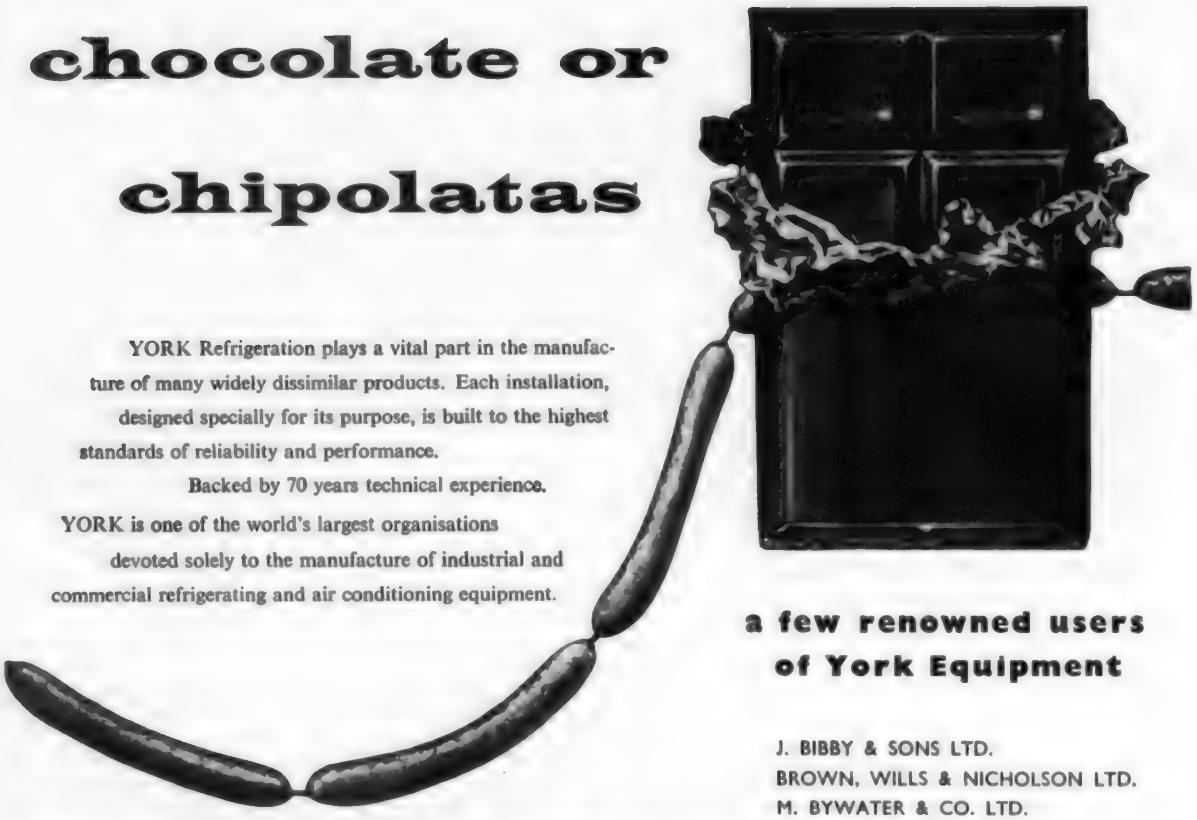

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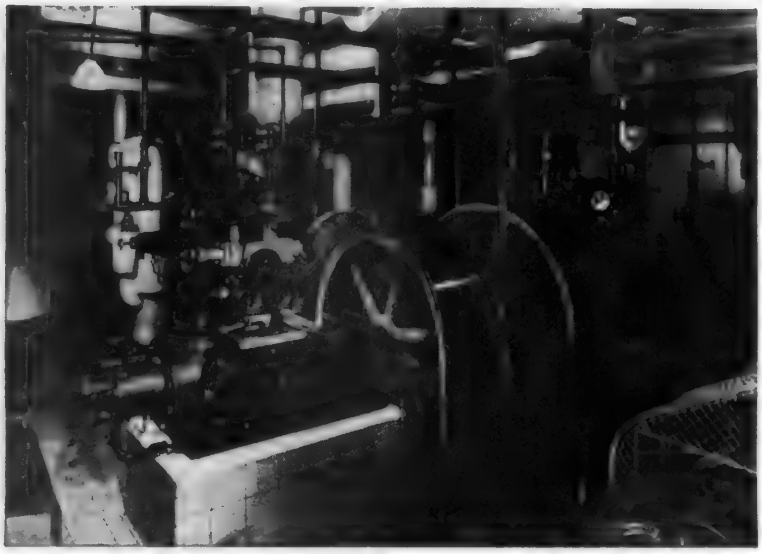

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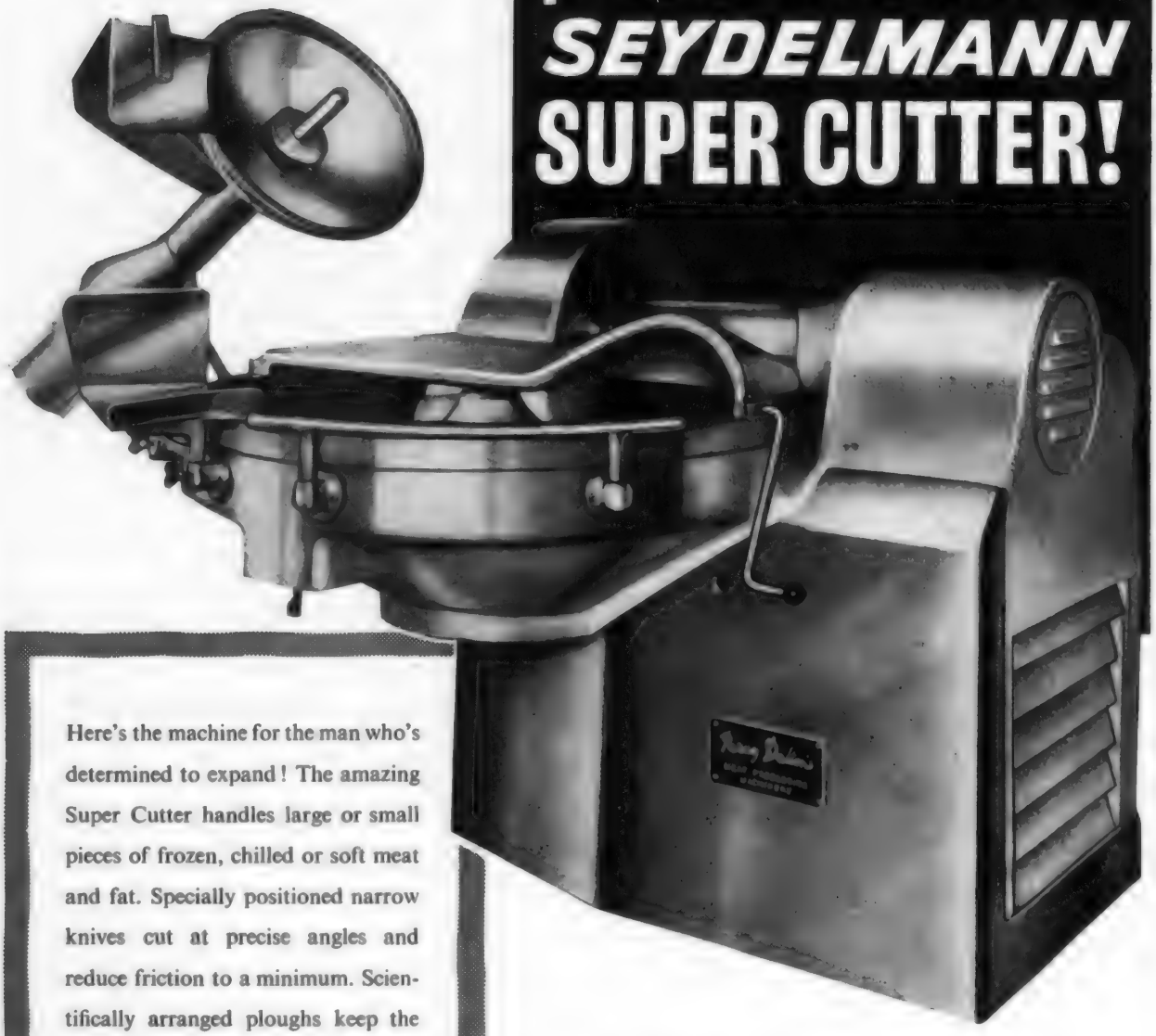

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CORROSION EXHIBITION

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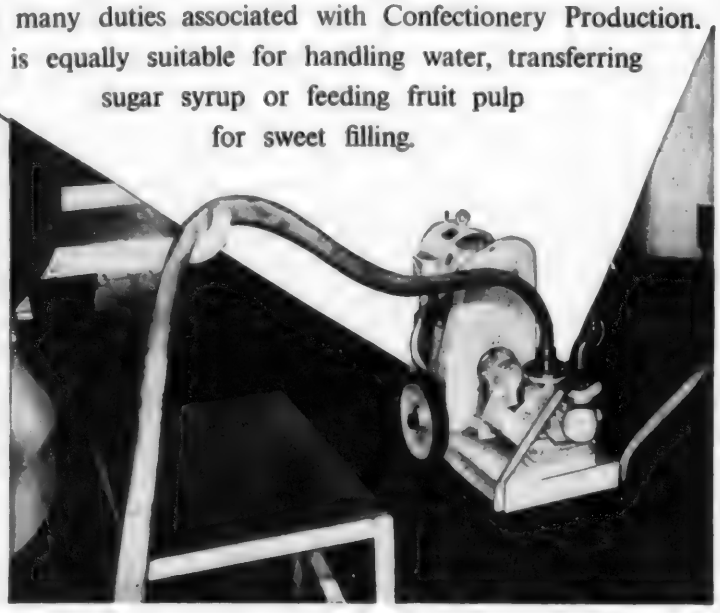

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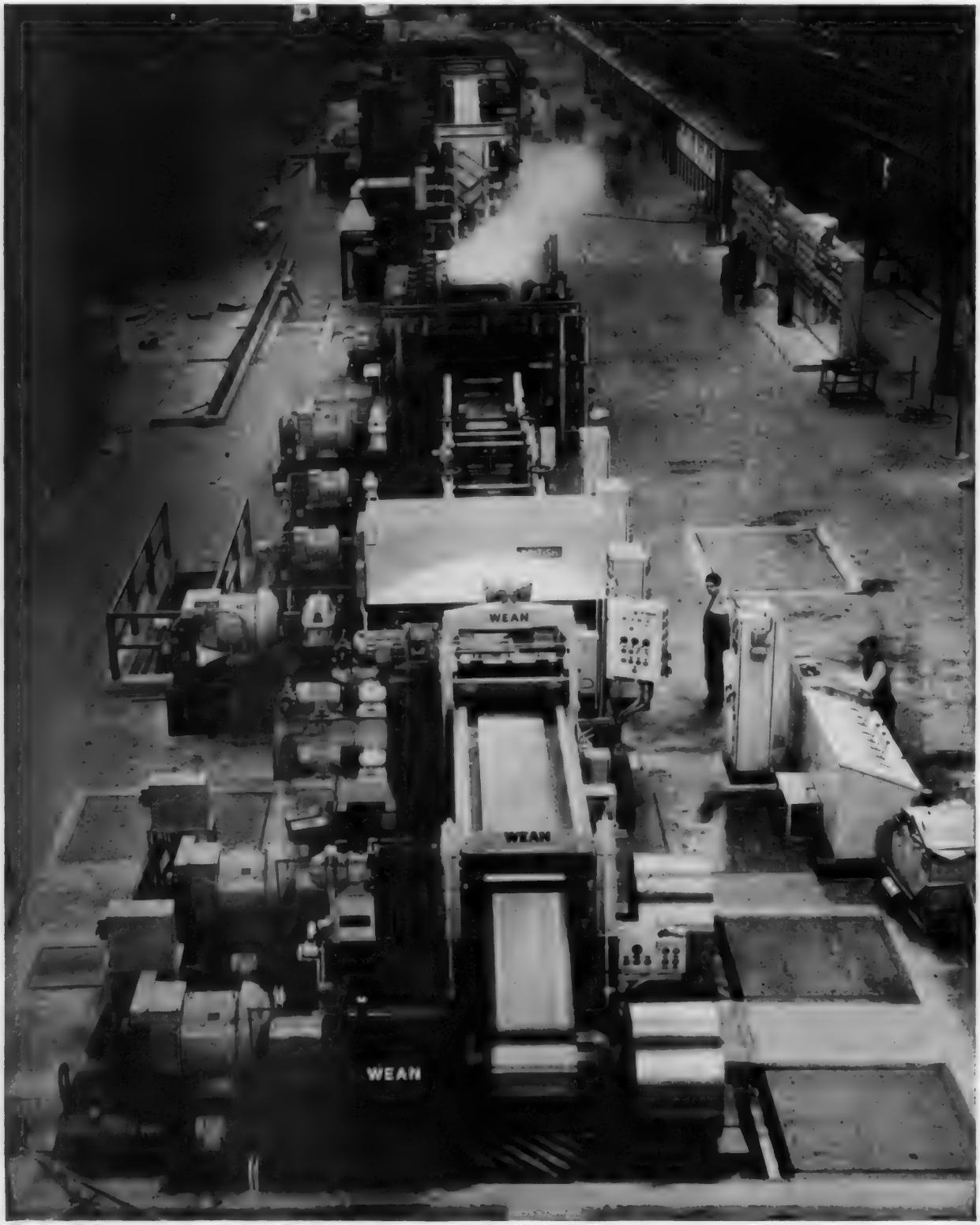

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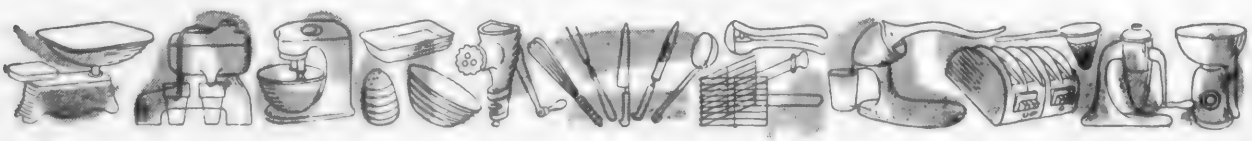

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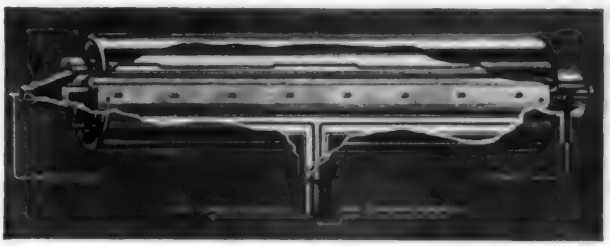

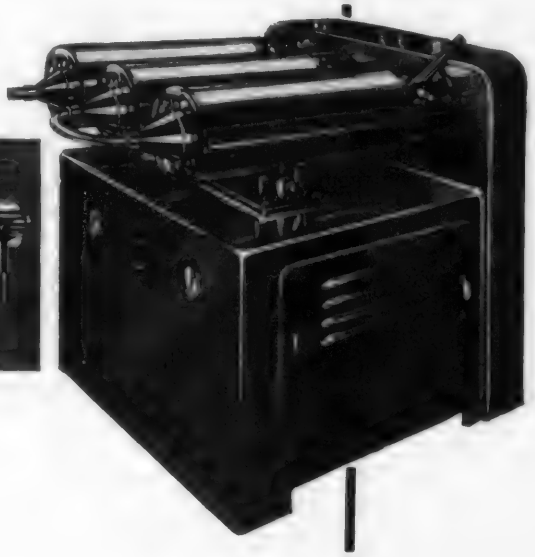

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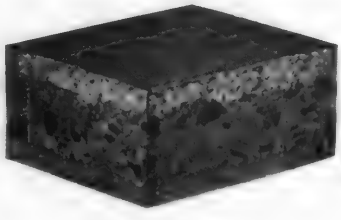

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FOOD MANUFACTURE

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ADL 88—6

FOOD MANUFACTURE

Vol. XXXII, No. 7 July 1, 1957

Low temperatures—high productivity

THE importance of refrigeration to the food industry cannot be over-emphasised. Apart from being an efficient means of food preservation, it is an essential part of food processing, *e.g.* for cooling after pasteurisation, low temperature carbonation, the inducement of rapid solidification, freeze-drying and many other purposes.

To take only one aspect of refrigeration: current developments in quick-freezing may radically alter the pattern of domestic and industrial catering. The quickening development of quick-frozen pre-cooked foods—incidentally pioneered by a British company—suggests an entirely new conception of dietary habits.

This issue of FOOD MANUFACTURE includes a short survey by which food manufacturers will be able to study some of the latest plant, equipment and installations available for low temperature technology.

Air conditioning—the control of air temperatures, composition, circulation, etc.—is also surveyed. The preparation of foodstuffs calls for a wide variety of controlled atmospheres. Baking and brewing, chocolate manufacture and the preparation of patent food products all call for certain optimum conditions of temperature and humidity. Our survey includes a review of air treatment plants.

The future market for canned fruit

O.E.E.C. figures show that in Western Europe the United Kingdom is almost unique in *not* increasing fresh fruit consumption per head over the pre-war figure. Switzerland alone shares this position, but her pre-war consumption per head was almost twice that of the U.K. and it remains still greater than that of any other O.E.E.C. country. Several countries have doubled their pre-war consumption of fresh fruit. It used to be believed that fresh fruit was one of those foods whose consumption rose with incomes, personal or national. This may explain rising consumptions in Europe, but, as a recent survey (*Agric. Rev.*, 1957, **3**, 61) establishes, price and income influences cannot account for the lack of expansion in the U.K. In fact, home-grown fruit prices have increased over pre-war levels rather less than the general price-index for food and tobacco, though this is not also true of imported fresh fruits. Admittedly 60% of U.K. fresh fruit consumption is imported (the pre-war figure was 77%), but for other countries in Europe where fruit consumption has risen sharply there is a similar price and supply background.

If post-war figures for our fruit consumption are analysed, the main fall from pre-war level has taken place with citrus fruits, particularly oranges, tangerines and lemons. Our consumption of apples is slightly above the pre-war level, although imports have been about halved.

On the other hand, consumption of canned fruits and fruit juices in the U.K. has risen very considerably from pre-war standards. The nearest European country for fruit consumption in these forms is Western Germany, but even her consumption is only 16% of the U.K. annual quantity. Here the pre-war tonnage of canned fruits was about 250,000 tons p.a.; now it is over 350,000 tons. The share of home-produced canned fruit is small, but it has trebled since 1938, rising from 32,000 to 91,000 tons (1955). An interesting comparison can be made with the U.S.A.; there, during the past ten years, fresh fruit consumption *per head* has been falling, but canned fruit production has more than doubled and fruit juice production has shown an eight-fold expansion. Clearly, a rather similar trend is occurring in the U.K., a food habit change swinging away from fresh fruit towards canned fruit products. Ease of use, lack of waste, indefinite keeping in the can—these are the causes; though it could be asked whether better attention to quality and condition at the retail end of the fresh fruit market might not have slowed down the change in Britain.

Certainly there seems no other explanation but that of change in food habits for the static situation of fresh fruit consumption here. Public knowledge on nutrition and the value of fruit in diets has increased since before the war; there is no obvious economic disability facing fresh fruit sales. However, for the canner and fruit processor, the change makes the U.K. a much more attractive market. The home-canning industry at present has a 25% share of the total canned fruit tonnage per annum—could this be raised?

Diet and data

THE important part played by electronic computers in industries requiring a large amount of scientific calculations, *e.g.* aircraft manufacture, optical instruments or atomic energy, is known to everybody; their usefulness for food manufacture is less obvious.

A connection between the two is formed by a fairly recent branch of mathematical economics known as "Linear Programming." As it happened, one of the problems leading to its inception was connected with food. This problem can be stated as follows. Supposing we are given, firstly, the daily minimum requirements of the average consumer in calories, minerals, fats, vitamins and other "food factors"; secondly, the amount of each of these food factors contained in a unit of typical foods such as bread, milk, cheese, butter, eggs, meat, fish, fruit and so on; and thirdly, the prices of all these foodstuffs. It is obvious that the minimum food factor requirements can be met by a variety of diets composed of different amounts of the various foods; each such diet will have a certain total cost, and one of them will have the lowest cost of all. The problem is to determine the composition of this least-cost diet.

It is reported that the first mathematicians given this problem came up with the answer that the least-cost diet required the daily intake of minus 2 lb. of carrots. Whether this story is true or invented, it was soon realised that one postulate to be satisfied was the non-negativity of the solution. Mathematically, then, the problem can be formulated as that of finding a non-negative set of variables (the amounts of each food) satisfying a set of linear inequalities (expressing the minimum requirements in a food factory and, possibly, additional constraints) and minimising a certain linear function (called the objective function or functional, here the total cost). The Linear Programming method provides a tool for solving problems of this type.

The same sort of problem occurs wherever ingredients are mixed to provide a composite end product, say cattle fodder or dog biscuits. Manufacturers are interested (or ought to be) in finding the least-cost mix which will allow them the lowest possible selling price or give them the highest possible profit. Some of them are already using the L.P. technique to provide these answers.

In practical cases, where the numbers of foodstuffs and food factors run into several dozens, it is still a formidable task to carry out the necessary computations, and several man-days will be required for each problem even if the computing staff is provided with desk calculators; by the time the result is available a change in the prices of raw materials might well make it valueless. It is here where electronic computers come in; a fast machine such as the Ferranti *Pegasus* (one of which is available to the general public in London) can provide the solution to a typical problem in 5-10 min. The only preparation required is the punching of the tape containing the "data" of the problem, *i.e.* the numerical coefficients specifying the composition of the foods in terms of the food factors, the minimum requirements (and other constraints), and the food prices; this work is done by semi-skilled operators and does not require the use of the machine itself.

Savings obtained by applying this technique have been found to be of the order of 3-5% of the total turn-over. While this may not sound spectacular, it will be very much worth while in cases where the weekly turn-over is of the order of tens of thousands of pounds, and it will certainly be a large multiple of the amount spent on hiring a machine for least-cost mix computations.

Bigger and fewer breweries

SIXTEEN amalgamations between various breweries have taken place recently which raises some interesting questions on the economics of this trend. How profitable are these mergers and why are they taking place? Apart from the reasons implied by Lord Mancroft (see *Obiter Dicta*, p. 347), Arthur Seldon in the *Financial Times* has suggested that the industry is cutting out its dead wood. Death duties, taxes and generally the "loaded law" against the private brewery and the licensed house have made the trend inevitable.

An interesting example of the economics involved in brewery mergers is given by Mr. Seldon, who examines the position of a brewery, which he calls "A", after it had absorbed a small firm, brewery "B". Although "A" undoubtedly profits by the transaction, the economies effected are accompanied by several extra costs so that the ultimate profits are not very great. For instance, although "A's" output is now larger, so is its payroll. Overhead costs have fallen and may fall even more, but direct costs —such as those of raw materials, malt, hops, sugar, casks and bottles, increase in much the same proportion to output. The economy in administrative staff costs is fairly high, but extra staff are needed to supervise the retail houses and more salesmen are needed in approximately the same proportion as output.

Transport costs have not increased much, because brewery "A" sold "B's" fleet of 13 lorries and bought four new ones which can be maintained by their existing staff. The greatest economy in an amalgamation is in the closing of uneconomic public houses. When two medium-sized breweries merged recently 14 pubs were closed because their trade was too small to justify their maintenance.

Fuel for fish friers

FISH and chips is practically the British national dish, however much gourmets may deplore the fact, and the fish frier is a very important person, especially in seaside towns. The Gas Council, which supplies most fish friers with their equipment and fuel, has been disturbed lately by an advertising campaign for oil firing. In consequence, the Industrial Gas Development Committee has been investigating the extent of this competition. The main advantage claimed for oil-fired ranges is that they enable the frier to take trade fluctuations in his stride —for trade is largely governed by the impulsive nature of the average fish and chip eater and a sudden rush of custom during, say, a television breakdown makes serious demands on equipment designed for a steady output.

Worried by a possible nation-wide switch to oil-fired equipment the Committee interviewed 102 fish friers in seaside, residential, and industrial areas and has reported its findings. Apparently the position is not as serious as was originally feared. Many of the fish friers interviewed took the opportunity to complain of the price of gas and to criticise the high running costs, but generally they were satisfied. The Committee suggests that consideration might be given to designing burners and combustion chambers providing high rates of heat release and greater heat retention so as to cut fuel costs and provide the occasional bursts of extra activity required.

A footnote to the report records, with as much satisfaction as official language will allow, that the original oil-fired range which was so widely publicised amongst fish friers, became too much trouble for its proprietor and he has replaced it with a gas range.

Advocacy for instrumentation

COMPETITION is probably the most important single factor responsible for the adoption by larger food manufacturers of instrumentation, automation and other modern techniques. However, competition is no less fierce among the smaller food producers, and the public demand for uniform standards of quality is no less strong. This was the theme of an address on "Instrumentation in the food industry" delivered by Mr. A. G. Goodall, the general works manager of Batchelors' Peas, Ltd., at the recent Instruments, Electronics and Automation conference. Mr. Goodall was able to show that not only can the food manufacturer achieve consistent quality by means of good instrumentation, but at the same time it will ensure that the most economic use is made of raw materials, power, water, etc.

Instrumentation, said Mr. Goodall, is not to be undertaken without the most careful consideration because otherwise good capital is poured down the drain. On the other hand, when the manufacturer has made a careful study of each process to find out which can benefit from control—in this connection the smaller man may find it advantageous to use his trade research organisation—he will find that he knows what is happening in his plant, he is producing standard quality and yields of his product, he is standardising and reducing the wastage on his raw materials, reducing scrap on his final products and the costs of his labour and process methods, keeping high capital cost equipment fully utilised and improving the safety of his products.

The importance of good instrumentation has long been recognised by FOOD MANUFACTURE. Readers will have noticed that our recent reviews of various aspects of the food industry have included articles on the specialised instruments employed. As Mr. Goodall pointed out, planned instrumentation is a good foundation on which to build a reputation for consistent quality and to obtain the maximum yield from materials and plants.

Pioneers of pea research

"CANNERS' DAY"—as the annual meeting of the Fruit and Vegetable Canning and Quick Freezing Research Association is popularly known—was especially notable this year as the first official function of the new director Mr. W. B. Adam, who succeeded Mr. Fred Hirst, after nearly 30 years as director of the station.

The careers of Mr. Hirst, Mr. Adam and the Chipping Campden Research Station on the one hand and that of FOOD MANUFACTURE on the other have interesting links. Mr. Hirst became the director of the station in 1928 after five years as one of its first research workers. The first volume of FOOD MANUFACTURE in 1927 (October, p. 140) recorded the intention of Mr. A. Appleyard to leave Campden Research Station for an appointment in South Africa, and in the next issue (p. 144) there appeared an illustrated account by him of Campden. In our issue of June, 1928 (p. 374), Dr. Stanley Smith, in a report on the Canning Convention, referred to Mr. Hirst as the resident director of Campden and to Mr. Adam as his assistant. In this article Dr. Smith suggested that it would be more appropriate if the research station were an industrial research association with D.S.I.R. help—it was then attached to the University of Bristol—but this change in constitution did not take place until nearly 25 years later. Two months later, an editorial asked for the development of Campden as a training centre for cannery technicians. Later in the same year we referred to "the harmless green

colouring agent discovered by Mr. Hirst of the Campden Research Station", and in December, 1928, Mr. Hirst himself contributed an article on modern methods of canning peas.

At that time there were very few fruit and vegetable canners, and the work of the research station was designed so as to make it the research and advisory centre for a canning industry based on sound scientific principles. The outstanding practical results of the investigations at Campden were the introduction of a satisfactory method of canning green peas, and in 1939 the development of a method of canning potatoes which was widely used during the war.

Mr. Hirst became the secretary of the Fruit and Vegetable Canners' Association, the Secretary of the Pea Pickers' and Packers' Section of the Association, and later Technical Secretary of the Home Grown Threshed Peas Joint Committee (now the Pea Growing Research Organisation, Ltd.). He served on many committees, and was appointed Hon. Canning Advisor to the Ministry of Food and was also made a director of Candisco, Ltd., the company formed by the Ministry during the war to distribute and sell canned beans in tomato sauce. As a result of his activities in helping to establish the fruit and vegetable canning industry and because of his services to the Ministry of Food, he was created O.B.E. in 1954. Since 1949 he has been a Justice of the Peace in Gloucestershire.

Nearly thirty years after their first association, Mr. Adam is director and Mr. Hirst has retired, but continuing as consultant. During this period the two names have always been closely linked with progress in the canning industry, and it is no coincidence that this industry has grown from almost nothing in 1927 to its present importance, a period which has also seen the outstanding growth of FOOD MANUFACTURE.

Ageing of bulk flour

FLOUR ageing is one of those controversial topics that can always be relied upon to provide hours of discussion and speculation among bakers and millers. There is no doubt at all, according to the mass of published evidence, that flour does change with age, but nearly all of this information is concerned with changes over years or months, while it is with periods of from two or three weeks that the baker and miller is most interested. The greater use of bulk handling for bakery raw materials makes it imperative to know more about the changes which occur in flour during storage.

The problem was discussed by D. B. Pratt of Pittsburg Mills, Inc., the big U.S. flour millers, at the recent annual meeting of the American Society of Bakery Engineers. He loaded a conventional type railway wagon with a bakery flour and studied it for changes in chemical and physical characteristics over a period of three weeks, subjecting the flour to commercial baking procedures at regular intervals. Chemical, physical, and microbiological tests, he reported, all show that certain minor changes do take place.

The changes, which were very slight, occurred between the seventh and the twelfth days of storage. It would seem from the tests that flour age is not a critical factor in determining bread quality if the flour used is of normal baking strength, because the baking process is not sensitive enough to demonstrate the slight changes in the flour. Mr. Pratt concluded: "If a baker is making good bread and his shop is properly adjusted to his flour supply, he can change at will from the bagged product to bulk and suffer no change in bread quality. His only change might be to adjust water absorption to compensate for a slightly higher moisture content in the bulk product."

Educational discipline

WHAT is the object of education? This monumental question was posed and partly answered by the distinguished American food technologist, C. Olin Ball, recently. Fortunately, he confined himself to answering the question from a food technologist's angle so that his conclusions were neither too deep, too philosophical nor too lengthy.

Mathematics, the sciences and the classics are the "real mental muscle building courses" considers Mr. Ball, and these must be restored to greater prominence than ever before. His main argument is that the objective of education is not to provide factual information but understanding. "Wisdom in the use of facts is the essential attribute for the solving of problems in the complex life of today", he points out.

This definition, according to Mr. Ball, answers the question as to whether or not food technology students should be separated into more than one category from the standard of curriculum. He suspects that the student who wishes to study an off-shoot from a basic curriculum in food technology "simply does not want to exert himself sufficiently to get the kind of training that a B.S. degree implies he has had." Future research workers, production managers and administrators do not need any undergraduate courses of a specialised nature and different from a food technology curriculum. This does not mean that Mr. Ball is against specialised training. He simply thinks it makes little difference what a student specialises in: in fact, it broadens a student's comprehension to get his first knowledge of operations and processes in a different field from that in which he expects to apply it.

The FACTS about FATS from CBC

"Food Manufacture" examines the manufacture of bakery margarines and shortenings at CBC's Bromborough factory and the complementary test work at the Service Bakery at Sussex House, London.

WHEN the Margarine Unic bought the Craigmillar margarine factory near Edinburgh during the decade of intense competition and expansion amongst margarine manufacturers after the First World War, the business already enjoyed a good local reputation for quality. Today Craigmillar and British Creameries, Ltd., as part of the Unilever organisation, is well known amongst bakers and manufacturers throughout Britain and beyond for speciality margarines, shortenings, etc. The company's *Marvello*, *Dolphin* and *Splendo* margarines, *Silkit*, *Golden Cloud* and *Covo* shortenings, *Hyvo* and *Flex* are as well known to the baking industry as *Stork* margarine—sold by their associates Van den Berghs, Ltd.—is to the general public. Indeed, the two companies have worked in conjunction at Bromborough since Craigmillar's business outgrew its original premises in Edinburgh. The head office is now at Sussex House in the City of London, which also houses the sales administrative department and the extensive Service Bakery. The company still has strong Scottish connections, for the main order and cash office is housed in the "Scotsman" building in the centre of Edinburgh. Bromborough Port, situated on the river Mersey, is in an ideal position to receive the supplies of vegetable oils which are the main raw materials of margarine and shortening. Bromborough has its own docks where specially equipped tankers and cargo vessels bring in the oils and oilseeds, groundnut, palm, palm kernel, coconut and cottonseed. The oils are transported to the factory by rail tanker.

Above: **Showpiece of the Bromborough works is the immaculate 300-ft. long refinery. Deodorisers are in the foreground and neutralisers are in the rear.**

Bakers use two types of margarine—cake margarine and pastry margarine. Cake margarine must have good creaming powers as on these depend the volume and the texture of the cake. It should also provide a good crumb structure and flavour. Pastry margarine has a higher than normal melting point and must be tough and plastic, to withstand the rolling of the dough into thin layers. A good

pastry margarine provides the baked product with a structure consisting of layers which should be distinct and separated by fat. They must not break and crumble.

Whatever the product, it must have consistently uniform properties, since baking today is becoming more and more mechanised and a good reputation depends very much upon upholding quality.

The same applies to shortenings and to other cooking fats. Industrial shortenings are used for making buns, pie crusts, cakes, biscuits, wafers, etc. Their properties differ to suit various purposes and their characteristics may be varied by choosing the proper fat or fat components, by controlling the selectivity of the hardening process and the melting point of the hydrogenated fat or fats and by the method of manufacture. When a very hard fat is mixed with a soft fat or with one or two lightly hydrogenated fats a relatively plastic material is obtained. Shortenings in which all components have been hydrogenated cost more, but they are more uniform and stable. Stability is the main consideration with shortenings used for making biscuits, cake mixes and other goods that are not packed in hermetically sealed containers and for which a good shelf life is a necessity.

CBC have a range of seven types of bakery fats. Besides cake and pastry margarines they make unsalted margarine, white shortening, golden shortening and special fats for high-sugar cakes and puff pastry.

Refining

The manufacture of both margarine and shortening starts with the refining of the incoming natural oils to remove unwanted colouring matter and other impurities. Some vegetable oils, *e.g.* coconut, are solid fats at normal temperatures, but most natural fats are liquid and are hardened by hydrogenation to give them the desired melting point. Refining is carried out in a new edible oil refinery (see FOOD MANUFACTURE, September, 1956, p. 381) which is thought to be the largest and most efficient in the world. Refining is essentially a two-stage batch process: first, the crude oils are neutralised and bleached, and, secondly, they are deodorised. Although the rest of the production is a continuous process, oils are refined in batches because their differing compositions and characters call for differing methods of treatment.

The oils are first received into 14 neutralisers, each holding 30 tons. Here they are treated with caustic soda, which combines with the free fatty acids to form water-soluble soap. This is withdrawn from the base and may be used eventually in soap manufacture. The neutralised oil is next treated with bleaching earth and then pumped through a series of plate and frame filter presses. Now that it has been neutralised, bleached and filtered the oil is essentially ready for processing except for its flavour. The remaining trace impurities are removed in the deodorisers—thirteen vessels each of 25 tons capacity and one smaller pilot plant vessel holding 4 tons. Steam is distributed through the hot oils (they are at about 180°C.) under high vacuum for from between 4 to 8 hr., depending upon the nature of the oil. After this the oil is cooled and run to weighbridges, each holding 25 tons before it is passed on to the production departments.

Ten men per shift operate the neutralisers and deodorisers with another 12 on ancillary tasks. Prominent features of the refinery are the control panels in the neutraliser and deodoriser sections which indicate which vessels are in use, kinds of wash waters to be withdrawn, temperatures, pressures, amounts of cooling water and condensing water available and the remote control of certain pumps. Electrical devices are used for recording and signalling.

Unquestionably the refinery is a showpiece of the Bromborough works. Over 300 ft. long it is brightly painted with its aluminium-clad vessels highly polished and spotlessly clean. The high-pitched noise factor common to vacuum systems has been considerably reduced by the installation of ingenious valves invented by the refinery manager and by the use of glass fibre insulation around the vapour lines. Besides the very favourable impression it makes upon visitors the gleaming appearance of this refinery has

Pasteurising unit in the "dairy."

Pastry margarines, because of their tougher and firmer nature, are made on the churn-drum process. The margarine emulsion is cooled on these large refrigerated drums and scraped off into the trucks.

had an inspiring effect upon the men who work there. They take an immense pride in keeping the refinery immaculate.

Dairy

Ripened milk is used as the aqueous phase in margarine made at Bromborough. Ripening is by a bacteriological process similar to that used in the manufacture of creamery butter and is carried out in the "dairy." Skim milk is received from the Milk Marketing Board, passed into receiving vessels and then pumped through High-Temperature Short-Time pasteurisers. The pasteurised cooled milk is passed into stainless steel ripening vessels (about 600 gal. capacity) provided with a slow-moving stirrer arm, and inoculated with a small percentage of a carefully grown strain of bacterial culture. The lactic cultures are propagated in a special section of the factory. Their cultivation and selection is highly skilled work, and all the men who take part in it have had many years of experience. Throughout the ripening process checks are made on samples withdrawn from the vats.

Shortening

Charges of refined oils for use as shortening are pumped from the refinery to the blending room, which contains twenty glass-lined 25 ton tanks in which the oils are kept fluid at temperatures appropriate to their melting points by warm water circulating through heating coils. In the centre of this room is a control panel manned by an operator who draws charges of oil from any of the storage tanks through air-operated valves and blends them in one of two weighbridge tanks according to a predetermined composition. The blended oil is then pumped away to the Votators.

Votators

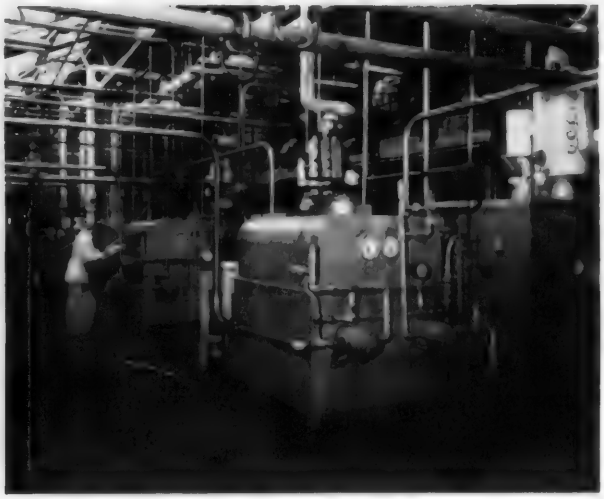
Cake margarine and shortenings are all processed through the Votators. This equipment replaces a series of operations by a single continuous process carried out in a totally enclosed machine. Its function is to produce a homogenous blended fat with a smooth workable consistency. The warm liquid fat enters the Votator where it is rapidly cooled by passing through a series of three tubes, each of which is refrigerated by an external ammonia jacket. As it cools, the blend is removed by rotating scrapers. From these cooling tubes the mixture passes into two cylinders where revolving agitators knead it. From the agitating units the blend is passed at increased pressure through a texturating valve to the filling point and is filled as a semi-liquid material.

Shortenings are 100% aerated fat blends. When the Votators are used for the manufacture of margarines the blended oils are first passed into pre-mix vessels where they are mixed with ripened milk as the aqueous phase and salt in the form of brine. Otherwise the process is similar to that used for shortening.

The weighing and filling or dispensing machine for bulk margarines and shortenings is essentially simple. A common feed line connected with the Votator serves two simple filling nozzles. Each of these is manned by an operator supplied with empty parchment-lined boxes from a conveyor (covered with *Perspex* anti-dust shields), and as the boxes are filled he places them on another conveyor travelling to a sealing machine. Only one filling point operates at a time. When a box has been filled the supply switches automatically to the next point and the operator uses this time to make his box ready for the next filling.

Pastry margarines

Because of their tougher and



Left: **The oil blending room with its semi-automatic control panel.** *Right:* **A line of votators which cool and plasticise the oil blends.**

firmer nature pastry margarines continue to be made on the Churn Drum process. The blended oils and ripened milk, palm oil concentrate for colour and brine are stirred by revolving paddles in a series of 1½-ton churns until mixing is complete. The resulting emulsion is pumped to a trough feeding one of four ammonia-cooled rotating drums. The temperature on the surface of these drums is about −20° to −24°C., and by the time the drum has made one revolution (this takes about 3 seconds) the blend has solidified and is scraped off in thin flakes and dropped into aluminium containers. The product is now, in fact, pastry margarine but without the desired texture. The flake is allowed to mature in the containers, during which time a certain amount of crystallisation takes place before it is passed through a texturising machine, which combines a rolling with a working action, operating under vacuum.

Testing

Samples of all products are put through carefully standardised routine tests in the test bakery and in the laboratory. The test bakery has a constant temperature room, and samples of all cake making products are kept in this room for 24 hr. before being subjected to creaming tests. The laboratory and test bakery work in conjunction with the appropriate departments at Sussex House in London. In Sussex House Service Bakery we find the research bakery equipped with thermostatically controlled ovens and controlled speed mixing machines, the development bakery where problems of recipes and production methods are resolved and the commercial bakery for commercial batch testing and where demonstrators are trained and demonstrations are held.

Despatch

At Bromborough the finished products are stacked on pallets in 1-ton loads in the assembly room. Shortenings are held here at a controlled temperature for two or three days before release. Fork trucks load the palletised products on to road vehicles and into ventilated railway trucks in the factory's own sidings. The trucks are fitted with special partitions to prevent movement and chafing of the containers during transit.

Every baker must satisfy a multiplicity of tastes, and CBC's complete range of fats can be used in several hundred different products. It is equally important that the qualtiy of these products should be uniform, and constant checks on quality are carried out at all stages of production. Daily tasting panels are held to sample all products from refined oil onwards. Laboratory controls on raw materials and finished products continues round the clock in keeping with the 24-hr. working of the plant.

The factory has straight line production, the extent of which is effectively revealed by looking down the visitors' gallery, which is a quarter of a mile long.

SOME SUPPLIERS OF EQUIPMENT

Refinery—
Deodorisers: *A. J. Riley and Son, Ltd.*
Neutralisers: *Wm. Neill and Sons (St. Helens), Ltd.*
Vacuum equipment: *Hick Hargreaves and Co., Ltd.*

Dairy—
H.T.S.T.: *The A.P.V. Co., Ltd.*
Souring tanks: *Dairy Supply Co., Ltd.*
Complector and packaging plant: *J. T. Hardaker (Food Machinery), Ltd.*

Compound Factory—
Votators: *The Girdler Corporation; (U.K. Concessionnaires: A. Johnson Co., Ltd.).*
Glass-lined store tanks: *Enamelled Metal Products Corporation, Ltd.*

Refrigeration Plant—
J. and E. Hall, Ltd.

Test Bakery—
Ovens: *General Electric Co., Ltd.*
Mixers: *The Hobart Manufacturing Co., Ltd.*

Despatch—
Pallet trucks: *Lansing Bagnal, Ltd.; Yale and Towne Manufacturing Co.*
Fork-lift trucks: *I.T.D., Ltd.*

Bell's Sale of Food and Drugs

WHEN the Food and Drugs Act, 1955, was passed, even before it came into force at the beginning of 1956, discussion was fairly general regarding when the new "Bell" would appear. One or two handbooks were issued, but everyone interested in general food and drug administration still awaited the appearance of Bell. Now that it has been published no one is surprised that it was necessary to wait. For 46 years, beginning with the 5th edition in 1910 until the 12th edition, published in 1947, Bell had been compiled by Mr. R. A. Robinson, O.B.E., T.D., Barrister-at-law, who was for much of that time the Enforcement Officer for the County of Middlesex. Now that Mr. Robinson has retired it is fitting that the new edition* should appear under the name of his successor, Mr. J. A. O'Keefe, B.SC., LL.B., Barrister-at-law.

In the preface Mr. O'Keefe pays tribute to Mr. Robinson, and informs the reader that much of the merit of the present work is due to the foundations he laid. But he fails to mention that he has not only changed the foundations, but that the superstructure is almost entirely different. Mr. Robinson planned the volume according to the chronological order of various Acts of Parliament responsible for food and drug administration. Mr. O'Keefe has divided the volume into eight books: Food and Drugs; Merchandise Marks; Sale of Food (Weights and Measures); Agricultural Produce (Grading and Marking); Slaughter of Animals; Pharmacy and Medicines; Emergency Regulations; and Miscellaneous. For full measure he adds an introduction and three appendices as well as tables of statutes and of cases.

The new arrangement is much superior to the old, since the Food and Drugs Act is generally regarded as the basis, not only of Food and Drug Administration as such, but, as has recently been illustrated in the case of river pollution, as an example of how various other Acts of Parliament should be operated. It can be assumed with confidence that any regulation or order not mentioned in Bell is no longer operative and any manufacturer who is concerned to know whether some emergency order is still in force or not, may assume that if it is not mentioned in Bell, it has been revoked or automatically repealed. The layman frequently wishes he had more definite information about the revocation or repeal of emergency legislation, whereas the lawyer is content to know that there is no longer any control. An instance of this might be, for example, the disappearance of "The Syrup and Treacle Order, 1950," but no one appears to have time to codify either the Emergency Legislation and its repeal or Emergency Definitions together with their various changes according to circumstances and their repeal.

One of the most interesting points for the manufacturer brought out by the author occurs on pages 10 and 31, where he stresses the fact that the onus of proof of an offence rests with the prosecutor and that this may be greater than that of the defence. When one remembers that Mr. O'Keefe is an enforcement officer one is grateful to him for giving such a point to his opponents, but it is to be hoped that those responsible for the administration of the Act will also take note of the warning.

A definition of food

What is "food"? There are one or two points, which have been introduced into the new Act, although it is stated merely to be a codifying Act, on which one would have been glad to have fuller information. Sections 91 and 92 separate "substances capable of being used in the preparation of food" from "food," but according to Section 135 "food" includes "articles and substances used as ingredients in the preparation of food or drink or of such products." The layman is very confused about this distinction and would be grateful for help from the lawyer.

There was considerable anxiety about the definition of food whilst the Bill was before Parliament, and Mr. O'Keefe makes it clear that food is no longer "generally defined" at all. How anyone can believe that a statement that a food does not include "articles or substances used only as drugs" is as explicit as "an article shall not be deemed not to be a food by reason only that it is also capable of being used as a medicine" passes one's comprehension, because whilst a "drug includes medicine for internal or external use" the Act provides no definition of medicine and this is a very debated point as was shown in the case of the Pharmaceutical Society *versus* Potter and Clarke, Ltd.

Mr. O'Keefe has performed a stupendous task in the compilation of the new Bell. There are one or two errors, but one is lost in admiration of a work, which has been produced so quickly and which contains such an enormous amount of accurate information compared with the small amount of debatable matter, of which so much is completely fresh. The work of cross referencing the prodigious number of notes and references alone must have been a most exacting job.

The first edition of Bell, published in 1886, was a modest little volume, costing 4s., and contained 79 small pages of text with a very good index. Many of the titles listed in that index, such as snuff and violet powders, have long since vanished. The 12th edition was a full octavo size with 529 pages and 70 pages of index, whereas the present volume has been expanded to 902 pages with 29 pages of index in two columns. For full measure we understand that a supplement is already in course of preparation.

THOMAS MCLACHLAN.

* *Bell's Sale of Food and Drugs.* 13th Edition by J. A. O'Keefe. Butterworth, London. Pp. 931+lxiv. £5 10s., postage 2s.

IMITATION CREAM

Manufacturing Data

By L. M. Hirchberg, D.Sc., Ph.D.

Here is a comprehensive and practical guide to the formulation and production of imitation cream. After defining his subject in detail, the author discusses basic ingredients, stabilisers, emulsifying agents, flavours and colours. Comprehensive processing information is given and the article concludes with a selection of formulæ.

THERE is a difference between artificial, or reconstituted cream, and imitation cream. Artificial or reconstituted cream is the product of emulsification of unsalted butter and milk, separated milk, or reconstituted dried milk. Under the Artificial Cream Act, 1929, all cream produced artificially, all containers used for it, and any goods containing such cream must be labelled accordingly.

Artificial cream may be made from ingredients derived only from milk and no other addition except water is permitted. The following are typical formulæ:

	Part.
1. Unsalted butter	1
Fresh milk	1¼
2. Unsalted butter	1¼
Milk powder	¼
Water	1

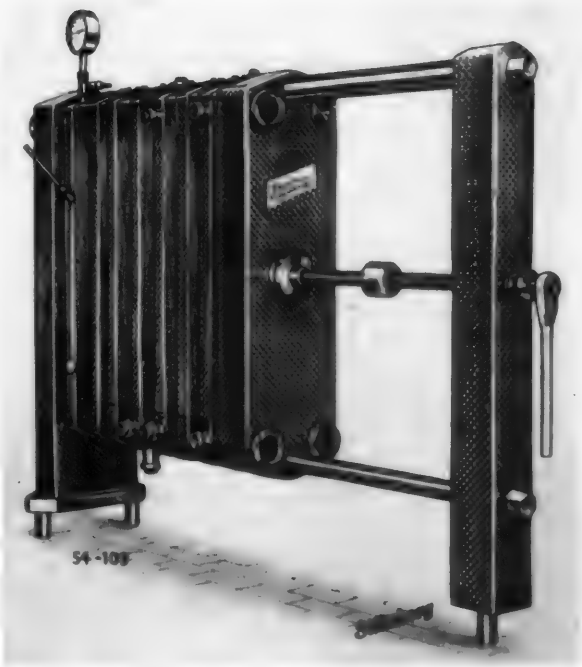
For its preparation the milk and, if used, the water are slowly heated to about 140°F., and the butter is gradually added in small pieces during heating. The mixture is then homogenised once or twice at the above temperature in a suitable machine at a selected pressure. The resulting product emerging from the homogeniser is cooled rapidly, preferably to a temperature of 40 to 50°F. and thereafter is allowed to mature by placing it in a cold store at about 50°F. for 10 hr. Artificial cream has the advantage of being able to be prepared at short notice as required from materials like milk powder which keep well.

If the butter used in artificial cream is replaced by unsalted margarine, the resulting product would come under the heading "imitation cream." No legal standard as yet exists for imitation cream. The Food Standards Committee came to the conclusion that as imitation cream is a product entirely different from cows' milk, it would be advisable to deal with it in a separate report. However, it has been stipulated that imitation cream should not contain less than 28% of fat and that the Heat Treatment Regulations should apply to its manufacture. According to these regulations the cream mix must be held at or above a specified temperature and be cooled below 45°F. within an hour and records be kept to show that the regulations have been complied with. A specified temperature would be the one of pasteurisation, say 170°F., at which the mix should be held for, say, 15 min. or longer.

The ideal imitation cream

The following are the properties of an ideal imitation cream:

1. It should contain a minimum of 28% digestible fat.
2. It should not contain any ingredients tending to irritate the palate, or too high a percentage of indigestible plastic fat which will remain undissolved on the tip of the tongue.
3. Its flavour should be neutral.
4. It may be coloured with an edible dye.
5. When unwhipped it should remain fluid on standing or in transport and should not solidify partly or wholly.
6. It should keep a reasonable period at room temperature, say three to four days in winter and two to three days in summer if it contains ingredients liable to rapid attack by bacteria such as egg products, milk powder, flour, etc., and up to 14 days if free from such materials.
7. It should whip to a firm and grainy mass within a given time dependent on the quantity which is being whipped. For example, two pints of a cream may require 5 to 7 min. and 4 gal. of the same cream 30 min. to be whipped to peak.
8. On being whipped it should yield from 2½ to 3 times its original volume and should not collapse on standing for a reasonable time.
9. When piping through a savoy bag the whipped cream should offer a fair resistance to the pressure of the hand if a clear and sharp outline of the piped figures is to be achieved.
10. There should be no weeping of water through the bag during piping.
11. No water should separate from a lump of the whipped cream on standing and the piped figures must remain dry, solid, and firm; they must not collapse or shrink but retain their shape for at least three days. Their surface should not easily yield to a slight pressure of the finger and the edges and ridges of the piped figures shall on standing remain clearly defined. A crucial test is to pipe the whipped cream between two slices of sponge cake and after three or four days the sponge should not become damp or soggy, thus proving that no water has separated from the cream.



Preheating, pasteurisation, cooling and regeneration are combined in this Danish-made stainless steel preheater.

Theory of whipping

The higher the fat content of a cream, the easier, the better, and the quicker can it be whipped. On whipping cream a cell-like structure is built up owing to the incorporation of air into the mass. It is assumed that the stabiliser, which is always added to synthetic cream and which is present in cream from cows' milk in the form of protein, collects at the air-liquid-interface and is thus responsible for the stability of the cell structure. The role which the fat plays in whipping is based on its ability to increase the rate of aeration. Large fat globules and low temperature, say 40°F., equally promote aeration, the latter owing to the tendency of the fat globules to coalesce and become semi-solid at low temperatures. The degree of aeration is to some extent adversely affected by the presence of cane sugar, prolonged pasteurisation, and homogenisation. As on continued whipping aeration proceeds, the volume of the whip is increased to a peak. Whipping beyond this maximum point causes complete coalescence of the fat globules, hence reduction of volume, and at the end, separation of a butter-like mass. This is called "overwhipping."

As soon as the cell structure begins to break down on whipping beyond the peak, water separates out and the whip loses its stable firmness; such cream cannot be satisfactorily piped and is bound to weep through the savoy bag. Goods filled with such cream will become soggy and the crumb will become wet. It would naturally be of great help to the confectioner and baker if the risk of overwhipping could be eliminated, thus leaving him free to carry out other duties while this operation is proceeding.

By the use of the correct proportions of some of the ingredients it is possible somewhat to extend the time during which the cream can be subjected to continued whipping without the danger of a breakdown of the structure, but the point when overwhipping will set in is ultimately bound to occur. It is always best to whip a large quantity of the cream at a time as thus the moment when overwhipping occurs can be extended considerably. Whipping should be carried out using a sterilised bowl and whisk which should be kept together with the cream in a cold room or refrigerator. Savoy bags should also be sterilised. The most suitable temperature at which to whip the cream is about 50°F.

Keeping quality

How long cream can be kept without decomposing depends mainly on its composition, and on the observance of all precautions to avoid decomposition during manufacture. Such precautions include sterilisation of plant, containers, etc., proper pasteurisation, and cooling, and cleanliness in handling by the operator. Ingredients such as dried whole egg, dried egg yolk, milk powder, flour, and the like are an ideal food for bacteria and a cream containing these, whether or not all precautions have been taken to avoid contamination, will have a shorter life than one not containing them. Generally speaking, bacteria found in decomposing cream are not harmful and may often be lactic bacteria only. However, enzymes may be present, especially when the water droplets in the cream are large and when air is allowed free access during the process of manufacture. These enzymes are apt to attack the fat and in time cause rancidity. A great deal of research has been done on the use of antioxidants to retard rancidity in fats, and some of them have certainly a marked influence on the keeping quality of some of the fats used for cream manufacture.

The *p*H value of the finished cream has also some bearing on its life and indicates the rate of decomposition in cream containing egg products, etc. It is advisable to adjust the *p*H of a cream free from the latter ingredients to *p*H 7 to 8. On ageing and during storage the *p*H will gradually drop to below *p*H 7. The addition of preservatives is prohibited.

Ingredients

There are a large number of fats from which synthetic cream can be manufactured so long as they are obtained fresh and pure, or have been purified by appropriate refining operations. The required degree of purity can be attained by such treatments as the removal of the free fatty acids, by bleaching, deodorising, and hydrogenation.

One of the most important requirements is that the nutritive properties of the fats should be satisfactory and that their melting point should not exceed 111°F., which is not very much higher than body temperature. Such a fat is almost completely digestible whereas fats with higher melting points are less digestible. They can be tasted on the tip of the

tongue where they remain unmelted and cause an unpleasant sensation. For this reason it is not advisable to add to imitation cream such a compound as glyceryl monostearate in such proportions as would cause a fatty sensation on the tip of the tongue and make the cream less digestible.

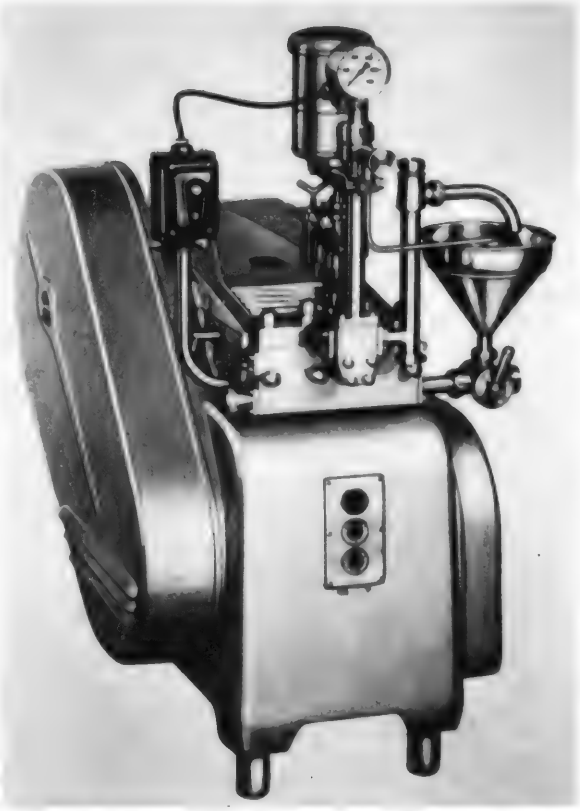
There are a number of analogous plastic fats with a melting point still higher than that of glyceryl monostearate, which is about 122 to 135°F.; these latter are sometimes recommended for addition to synthetic cream but prove unsuitable for the reasons just mentioned. All edible fats have an energy value of about 9,500 calories per gram, which is about 2¼ times that of carbohydrates and protein. All usable fats can be employed in their hydrogenated state. Thus palm kernel oil with an original melting point of 82·5°F. may be hydrogenated to one of 95°F. without reducing its digestibility.

Though not having much bearing on the selection of fats for the production of imitation cream it may be mentioned that the composition of fats has to be taken into consideration in the evaluation of fats for edible purposes. Thus a fat containing one or more double bonds is liable to become rancid. Nature has guarded against oxidation by incorporating antioxidants such as the tocopherols into fats and oils, but unfortunately they are liable to be removed wholly or partly during the refining processes.

Of the fats recommended for the manufacture of imitation cream, hardened palm kernel oil of the melting point 95°F. is regarded as the most suitable. The reason for this preference is that this hardened fat, together with other similar hydrogenated fats, has the advantage of possessing a uniform melting point and yields therefore a cream which not only whips to a somewhat greater volume, but, when whipped, exhibits firmness and grain. Liquid oils and fats of low melting point as well as compounded fats, owing to the form of their globules, give less volume on whipping and a softer whip.

Hardened coconut oil is frequently used, but its presence makes itself known to a sensitive palate by its nutty taste which it is not easy to mask. Unsalted margarine is another raw material, but it causes difficulties in manufacture unless it is mixed with something like 75% of partially hardened palm kernel oil. The same refers to compound fats, which may be used in admixture with not less than 25% hardened palm kernel oil.

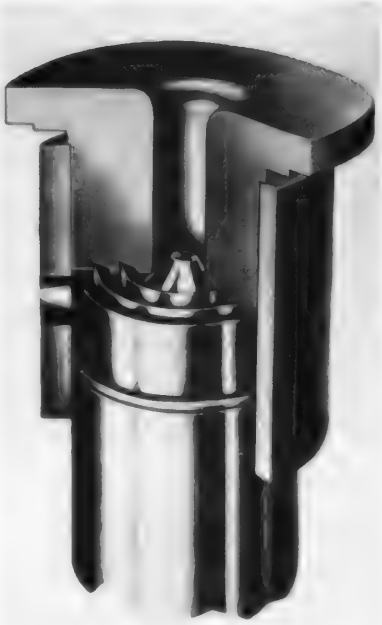
The compound fats available for imitation cream are either a mixture of 24% unhydrogenated palm kernel oil, 36% groundnut oil, and 50% whale oil, hardened to a melting point of 104 to 107·6°F. or are compounded from 41% unhardened palm kernel oil, 25% whale oil, hardened to a melting point of 115 to 118·4°F., and 34% of an edible oil. The more suitable mixture for synthetic cream is the former compound fat which is perfectly tasteless and satisfactorily digestible. By experimenting, all kinds of fats can be compounded, and the formula for making the cream adjusted by tests to suit any specific fat mixture. Preferably one of the so-called "soft" oils is used for compounding. To these soft or liquid oils belong olive oil, teaseed oil, groundnut oil, sunflower oil, sesame oil, maize oil, cottonseed oil, rape seed oil, mustard seed oil, soya bean oil. Whether these oils give a suitable blend for making synthetic cream depends foremost on the degree to which they are liable to oxidation as measured by their iodine value, keeping in mind the requirements already mentioned. The higher the latter the more an oil is apt to oxidise and thereby develop rancidity.



Hiron and Rempler's "Homo-mix" homogeniser with self-grinding homogenising head, is recommended for the manufacture of imitation cream.

Oils with a high iodine value have the tendency to oxidative thickening, and in some cases to foam slightly. To give an example soya bean oil is extremely prone to oxidation owing to its chemical composition, its iodine value being 130-135, which is high, and its composition, including certain double bond fatty acids in addition to the unsaturated oleic and linoleic acids. This oil is therefore very susceptible to oxidation on exposure to air, which results in the reappearance of the unpleasant "beany" flavour removed by refining. Groundnut oil, on the other hand, has the relatively low iodine value of 85-95 and is accordingly more resistant to oxidation, its chemical composition making it suitable for use in the manufacture of synthetic cream. Coconut oil and palm kernel oil, having the still lower iodine value of 9 and 15 respectively, show a high degree of resistance to oxidation.

The foregoing points have been discussed at some



This is the form of the homogenising head of the "Homo-mix" machine.

Photos in this article by courtesy of Hiron and Rempler.

length to show that the maker of synthetic cream is not limited to the standard fats and is in a position to compound his own fat mixture from a number of fats which are on the market without restrictions, in admixture with a certain quantity of other hardened fats like palm kernel oil. Usually, when basing the fat content of the cream at 28-30%, there is no need to consider the water content of the fats except in the case of margarine, which contains an appreciable quantity. Some manufacturers used sweetened palm kernel oil with the least possible percentage of sugar as long as it was available.

Sodium alginate

Sodium alginate is commonly used in the manufacture of imitation cream. It stabilises and emulsifies, though certain of its reactions must be taken into account. It is chemically fairly reactive, forming insoluble salts with soluble metal salts. It may gel in the presence of calcium salts, such as are contained in some types of gelatine. Stronger acids will precipitate alginic acid from sodium alginate solutions, but only if the *p*H drops to 4 which need not be feared in the case of imitation cream manufacture.

Sodium alginate has good keeping qualities, though it is subject to bacterial attack in solution. It is mainly used as a stabiliser in emulsions to prevent separation of water and, to some slight extent, weeping of the whipped cream during piping through a savoy bag. It possesses very limited emulsifying properties. The quantities recommended to be used for synthetic cream vary from 0·2% to over 1%. Amounts ranging from 0·2 to 0·4% are more likely to guarantee good results, though the higher figure in the form of a 5% solution in water tends to make the cream rather light and too voluminous. Large quantities may cause thickening of the cream and even solidify the emulsion, and they can be the reason for the formation of stoppages in the piping of the cream plant owing to the gelling effect of the alginate. To make solutions of sodium alginate, 20 parts of water are the best ratio for one part of the former.

Sodium pectate

Sodium pectate has lately been offered as a stabiliser for emulsions of cream in quantities of 0·1 to 1%. This product is also chemically reactive to a fair degree, and possess properties similar to those of sodium alginate.

Flour

Flour has always been used as a stabiliser for imitation cream, mostly in the form of cornflour. The flour is first gelatinised by heating to 60-70°C. until it assumes some transparency, using 10 parts of hot water for one part of flour. It is then added to the cream mix in the proportion of 0·3 to 0·6%. It is used in imitation cream, together with sodium alginate and dried whole egg. Full fat soya flour in quantities of 3-4% can be detected in imitation cream, but whether it has a stabilising effect if employed alone is doubtful. Any flour is susceptible to rapid bacterial attack, hence a cream containing it cannot be expected to have a long life.

Other products, serving as stabilisers and to some extent as emulsifying agents, are gelatine, agar, various gums and lecithin. There is also a host of other materials recommended as stabilisers and emulsifying agents in varying proportions.

Dried whole egg, yolk and milk powder

The above are important ingredients of imitation cream. Their effect rests more on their emulsifying power than as stabilisers. Sometimes they are found to the extent of 0·6 to 1% of whole dried egg, 0·25 to 0·3% of dried egg yolk, and up to 2% of milk powder. Dried egg products, milk powder, sodium alginate, a gum, gelatinised flour, and emulsifiers of various kinds are often used together within the limits mentioned. All creams which contain egg products, milk powder, gelatinised flour, or mixtures of these are easily attacked by bacteria and therefore have only a short life. There is, on the other hand, no doubt that both dried egg and milk powder improve the flavour of synthetic cream.

Glyceryl monostearate

This is an important emulsifying agent which possesses other useful properties. Self-emulsifying G.M.S., which forms stable emulsions in itself, sometimes contains traces of soap which give it an unpleasant taste. Its melting point of 122-134°F. shows, as has been mentioned already, that this body is not digestible and should therefore not be used in such proportions as might spoil the flavour of the cream. Used to the extent of 0·13 to 0·2% it forms fluid emulsions of a neutral flavour. Perhaps just as important is its power to counteract the tendency

of the cream whip to weep during piping, and to some degree to increase bulk on whipping the cream. The employment of wax-like compounds, which may be termed fat esters and which have a melting point still higher than G.M.S., cannot be recommended as they will impart an unpleasant taste and will cling to the tip of the tongue.

Methyl ethyl cellulose

If correctly employed, methyl ethyl cellulose is of great value as an emulsifying agent in synthetic cream and for increasing bulk. Solutions are prepared by soaking 10 parts of the material in 90 parts of hot water and leaving the mixture for 24 hr., stirring occasionally. On cooling, solution will take place. To make weaker solutions, more water can then be added, for example 100 parts to obtain a 5% solution, which is the strength usually chosen for the cream mix.

The material keeps well and remains stable if stored in a dry atmosphere. If the methyl ethyl cellulose is precipitated during processing, there is no need to worry as it will readily redissolve on cooling and will not cause a stoppage of the filter at homogenising temperature. It possesses quite good foaming qualities. The quantities recommended for addition to synthetic cream range from 0·25% to as much as 0·5%, but larger percentages than 0·375% or 0·4% at the outside tend to impart a metallic taste to the cream.

Owing to the property of this emulsifying agent to increase the bulk, the more of it which can be incorporated the larger the volume of the cream will become on whipping. However, if an undue amount is added, quite apart from the resulting metallic taste, the whip will turn very light and rather soft and will not pipe at the pressure necessary to obtain a firm configuration with sharp ridges.

Sodium carboxy acetyl cellulose

This is another good stabiliser, differing from methyl ethyl cellulose in that it is not precipitated on heating its solutions in water. If, as is presumably done in practice, it is employed as a stabiliser in the presence of the former compound, the correct limit is 2%.

Salt

As a rule from 0·06 to 0·08% salt is added to imitation cream to bring out the flavour.

Sugar

Small quantities of sugar (from 3 to 4%) are sometimes added to improve the flavour, but a larger amount may be responsible for a thickening of the cream on standing or in transport. It is better to leave the sweetening of cream to the confectioner, who will make the addition of sugar either before or during its whipping in a quantity of ½ lb. per gal. Fondant in amounts up to 2 to 2·5% is sometimes used by the maker as a flavouring agent and also to give a smoother product. Its composition is roughly 80% sucrose, 11% glucose, and 9% water, and its inclusion will not cause the cream to thicken.

Glycerine

To save the somewhat tedious operation of making a solution of sodium alginate in water, which takes time, it can be mixed with 1 to 2% of glycerine, the resulting mixture readily dissolving in water.

Flavouring

As already stated, milk powder and dried egg products improve the flavour of imitation cream, whereas in products free of these materials the flavour is bound to be slightly insipid. This is of comparatively little importance as far as the use of the cream for whipping by the confectioner is concerned since he relies on the flavour of the goods to which he adds the cream. Pronounced bad flavours, especially metallic, fishy, and soapy ones, can usually be traced either to metal utensils having been used or to a rancid fat. The presence of copper in as small a proportion as 1 p.p.m. can cause the development of bad flavours. As mentioned earlier, in cases where an exceptionally high percentage of methyl ethyl cellulose forms part of the mix a metallic flavour can make its appearance.

The flavour of a cream not containing milk powder and egg products can be improved by the addition of flavourings in the form of essences, for example, vanilla essence to the extent of 0·44%. Butter aroma is often added to cream, but care must be taken not to overdo the dosing. A good flavour is imparted to cream by incorporating one of the so-called cream flavours in quantity ascertained by experiment.

Colouring

There are a large number of edible dyes to choose from. If dried egg is one of the ingredients and not a great deal of milk powder is used, there is really no need to make use of a dye, as the colour of such a cream closely resembles the natural cream. A cream free from egg looks whitish, hence it becomes necessary to colour it. Any of the permissible yellow or orange vegetable or synthetic, water-soluble or oil-soluble dyes will serve the purpose. The quantities required to give the right shade must be found by experiment. The best dye appears to be a good brand of liquid, oil-soluble annatto. It is easy to measure and usually 0·088% is sufficient to secure the correct shade.

Process of manufacture

When once a formula has been chosen and proved by experiment to yield a satisfactory cream, one which fulfils the specification set out above, the procedure is as follows:

A mixture is made of the bulk of the water at an elevated temperature with those ingredients which are soluble or miscible or dispersible in it. This mix

should be as intimate as possibly can be achieved by continuous and efficient agitation. If egg products and milk powder are part of the ingredients, it is advisable to make an emulsion of them separately at about 133°F. and then to add the latter to the mixture of the other ingredients in water, dividing the water over the various mixes. Five parts of water are used as a rule to 1 part of dried egg product or milk powder (see also sodium alginate, flour, methyl ethyl cellulose, sodium carboxy acetyl cellulose). Vigorous stirring is a primary necessity to obtain a good final cream, and this can be easily done by employing a powerful stirring device.

The temperatures to which the mixtures are heated are, in the case of mixes free from egg, milk powder, and other coagulable substances about 122 to 184°F. In cases where coagulable materials form part of the final mix, some care must be taken to control the temperature so that it does not exceed the critical point where these compounds tend to coagulate and form lumps which are apt to spoil the smoothness of the cream and may even cause a stoppage of a filter. In such cases it will be fairly safe if the mix is kept at a maximum temperature of 167°F., which is roughly that at which spray-dried whole egg and egg yolk and the protein of milk powder commence to coagulate.

Mixes which do not contain coagulable ingredients are held at 122-133°F. during the mixing operation and, after a satisfactory and intimate dispersion has been obtained, their temperature is raised prior to the addition of the fat. If gelatinised flour is to form part of the mix, it is added when still hot and when the temperature of the mix is about 160°F. When the final mix is complete, whether it contains coagulable material or not, stirring is continued and the temperature is raised to about 167°F. During the time it takes to increase the temperature the fat (in which such fat soluble ingredients as G.M.S. and fat-soluble colours have previously been dissolved) is added. The best temperature at which to add G.M.S. so that it will dissolve instantaneously in the fat is about 150°F.

Mixes which do not contain coagulable ingredients can be heated to above the pasteurisation temperature, *e.g.* to 194°F. if desired. Water-soluble colours must be added to the watery portion of the mix at some convenient stage.

Air should be excluded as much as possible during the whole period of the manufacture, and this applies especially when adding the fat. Some manufacturers melt the fats in an overhead tank (hot water or steam jacketed) and run it in the liquid state through a system of perforated coils, or a suitable atomiser which is fitted at the bottom of the vessel containing the watery portion of the whole cream mix—that is to say, they atomise the fat under a certain pressure into the water mix which is to be at about the same temperature as the molten fat. There is no need at all for doing this; it is sufficient to run the molten fat through a funnel or a pipe into the water mixture, continuously stirring the latter and keeping the outlet of the funnel or pipe below the surface of the watery part. This will safeguard the fat against oxidation. After the addition of fat stirring is continued for at least 15 min. at at least 167°F. to effect pasteurisation of the mixture, which is then ready to be homogenised. The views on the pressure at which homogenisation should take place are very divergent as they are on the number of times homogenisation should be repeated.

Homogenisers are available for pressures of usually 1,000, 2,000, and 3,000 p.s.i. and even higher. For mixtures not containing coagulable ingredients, pressures of 1,000 lb., and two homogenisations are as a rule quite sufficient to obtain a good product, although one homogenisation at 2,000 lb. will also give good results. For mixtures containing egg products or milk powder or both it may be necessary to increase the pressure to 2,000 lb. anyhow for the second homogenisation.

The most suitable temperature of homogenisation is 112-122°F. Care must be taken to ensure that the homogeniser is fitted with an efficient filter and that this filter is cleaned frequently as otherwise stoppages may occur. It is always best to install two homogenisers when double homogenisation is carried out.

From the homogeniser the final cream is discharged into the cooler where it is cooled down, first to about 68°F. by means of cold water, then to 43-40°F. by refrigeration. It is always stressed that cooling should be rapid, which is quite correct, if a so-called open screen cooler is employed on which the cream is exposed to bacterial contamination. If a modern enclosed plate cooler is available, the time taken by cooling is not quite so important. However, even in this case quick cooling is to be recommended, as it gives the fat globules of the cream a chance to assemble and coalesce, stabilising the cream mixture and facilitating whipping later.

Some makers of cream store the finished product in a refrigerated room for 24 hr., prior to despatch, in containers of 3 and 5 gal. capacity, but it is better to store the cream in a larger closed vessel in a refrigerated room at, if possible, 50°F. and fill the despatch containers from this vessel. This is the better way of maturing the cream before sending it out. Tests have been made to store the cream in a suitable tank under nitrogen pressure, but no proof is available yet whether the life of the cream is thereby increased.

From the calculated bulk of the water for every batch of cream to be manufactured the operator must not forget to deduct any quantity of water used to dissolve or disperse, as the case may be, such materials as egg, milk powder, flour, sodium, alginate, and cellulose products and others.

Adjustment of the pH value

On embarking on the manufacture of cream free from egg, flour, and other perishable ingredients, it is advisable first to ascertain the average *p*H value of the water which is available, and, having done so, to make a trial batch of cream and again determine its *p*H value. The lower the *p*H of the water the lower

will be the one of the finished cream as a general rule. Should the latter be found to be below 7, it will be necessary to raise it, for example to something like 8 or even 8·4. This adjustment is carried out by the addition, gradually of course when making a test, of a small quantity of an edible inorganic or organic salt like a phosphate or a citrate or a tartrate or a mixture of these and weighing the amount used when arriving at the desired *p*H. When using phosphate, it is advisable to chose the di-sodium phosphate as it will assist to dissolve sodium alginate, in case this is used as an ingredient without preparing a solution of it first, simply by mixing the calculated quantity of di-sodium phosphate and the sodium alginate together in the dry state and sprinkling the mixture gradually on to the surface of the hot water or mix, stirring vigorously during the addition.

Formulæ

When making use of the formulæ given below, all the points which have been enumerated must be taken into account in order to produce a satisfactory cream. The formulæ can be regarded as a guide only.

1. A cream with a short life, say 2 days in the summer and 3 days in the winter, yielding a volume of about 250% on whipping, slightly weeping on being piped, inclined to thicken in transport, of good flavour and colour.

Composition:

30% fat, preferably palm kernel oil hardened to 35°C. mp. or a mixture of 75% of the latter with 25% compound fat, 68-70% water, 0·25% dried egg yolk, 0·3% sodium alginate.

If possible, pasteurise and cool in an enclosed plate-type preheater and cooler respectively.

2. A cream of good flavour and colour, giving a volume of 200-250% on whipping, keeping for about 30 hr. in the summer and 48 hr. in the winter, weeping only very slightly on being piped, but sometimes losing some water on standing of the whip.

Composition:

28% palm kernel oil hardened to 35°C. mp., about 68% water, 1% whole dried egg, 2% milk powder, 0·12% G.M.S., 0·25% gum, 0·7% salt, 0·6% sugar, 0·026% water-soluble dye.

Make in an ice cream plant.

3. This formula yields a cream of good flavour and colour whipping to a volume of about 250%, but weeping on being piped, having a life similar to the cream of formula 2, tending to thicken on standing and in transport and to shed water after being whipped.

Composition:

10% hardened palm kernel oil of 35°C. mp., 20% compound fat or margarine, making allowance for the water content of the latter, 68-70% water, 0·35% sodium alginate, 0·4% corn starch gelatinised, 0·7% dried whole egg.

Make in an ice cream plant.

4. A cream, artificially flavoured, of good colour, whipping to a volume of about 300%, having a life of about 13 days in the summer and longer in the winter, not weeping on being piped, piping well with good pressure and configuration and corresponding generally to the specification given earlier.

Composition:

28-30% palm kernel oil hardened to 35°C. mp. or a mixture of 35% of the latter with 65% compound fat, 68-69% water, 0·1% salt, 0·4% methyl ethyl cellulose, 0·2% sodium-carboxy-acetyl-cellulose, 0·25% sodium alginate, 0·175% glyceryl-monostearate, 0·09-0·1% annatto oil-soluble dye, 80 drops of cream flavouring per 100 gal.

This cream can be produced in an ice cream plant, but by using an enclosed plant the life of this cream can be further extended. Care must be taken when adjusting the *p*H value.

5. By increasing in the formula 4 the percentage of methyl ethyl cellulose to 0·425% a cream similar to the above can be manufactured with a volume gain on whipping of about 350%, but yielding a light and somewhat soft whip which, however, will still pipe fairly well.

Nutrition and Society

THE work of the Food and Agriculture Organisation and the World Health Organisation is well known to thousands of people. To supplement the fairly technical publications issued by FAO, a series of information pamphlets is being produced under the general title "World Food Problems."

The first of these* consists of three sections. The first part is a reproduction of the lecture given by Prof. André Mayer of France to inaugurate the Second Training Course for Nutrition Workers South of the Sahara, held in Marseilles in 1955, and organised by the French Government, WHO and FAO. Prof. Mayer died shortly afterwards, and the second part of the pamphlet consists of a short biography of "Monsieur FAO" as André Mayer was sometimes called.

The concluding section is a factual account of FAO's work in nutrition written by Dr. W. R. Aykroyd, the director of Nutrition Division.

The need for some more general information, as a basis for a wider public understanding of the main problems facing the Organisation and the ways in which it has adapted itself to these problems, has been evident for some time and was forcibly stressed by the Conference at its 1955 session. How this particular series will meet the problem is not quite clear, because it appears to be directed primarily to National FAO Committees, non-governmental international organisations interested in FAO and others who are presumably already familiar with the Organisation.

* *Nutrition and Society*. FAO, Rome. 1956. 25 cents.

REFRIGERATION AND AIR CONDITIONING

In the following twelve pages some of the outstanding developments in refrigeration, cold storage and air conditioning plant and equipment are reviewed. A special article deals with instruments and another with the design of air treatment plant.

Protecting Cold Stores

The problem in preventing a rise of temperature when insulated doors are kept open to allow goods to be taken in and out of store is said to have been solved by Minikay, Ltd., who have produced the *Miniveil*, which blows a high velocity air stream driven by an aerofoil fan across the open doorway.

The air curtain entrains the air in its immediate vicinity. Warm air blown or carried by convection currents towards the cold store is collected by the air stream and is unable to reach the cold store doorway. The protecting air curtain thus provided enables cold store operators to speed up handling.

Normally the unit is mounted directly over the outside of the door, but on sites where there is restricted headroom the arrangement can be varied.

The fan, made by Woods of Colchester, Ltd., is started as soon as the door is moved by the closing of a contact on the door frame.

These two "Miniveils," fitted with Woods of Colchester 'S' type 15 in. diam. aerofoil fans are protecting doors at the Greenwich ice cream depot of J. Lyons and Co. Ltd.

Flaked Ice

The latest in York Shipley's range of refrigeration equipment is the *FlakIce* automatic ice-making machine. This ice maker (Model DEB-2B) is claimed to produce over 250 lb. per day of clear fragments of ice "purer than the water from which they're made," which, say York Shipley, is equivalent to more than 300 lb. of cracked block ice. The refrigerant circuit is hermetically sealed and consists of a gas-cooled hermetic compressor, air-cooled condenser, vertical drum evaporator, condenser fan, water pump and decorative casing.

Water is frozen on a highly polished stainless steel revolving drum and the ice is automatically harvested from this drum by a manganese bronze nickel-plated ice cutter and flows over a stainless steel collector blade. The ice chute is one-piece porcelain enamelled.

The compressor is operated by a direct-driven, high torque, capacitor start motor, and York Shipley say that a 5-amp. plug is usually all that is required to operate the ice maker.

The company also produce a range of air- and water-cooled condensing units, including sectional *Economiser* condensers for use where water is scarce and unsuitable and where drainage facilities for large quantities are difficult. In effect, it is a combined condenser and forced draught cooling tower which is said to have many advantages over the old-fashioned atmospheric type condensers. It is claimed to save about 95% of the water consumed by shell- and tube-type condensers.

York also supply four-, six- and eight-cylinder v/w compressors for use in air-conditioning and refrigerating applications, sectional air-conditioners and similar equipment.

Air Dryers

After two years testing, the Lightfoot Refrigeration Co., Ltd., have introduced a unit type air dryer which they claim will maintain high operating efficiency at temperatures down to, and below, freezing point. Designed for protecting electrical and mechanical equipment in unheated buildings and for turning damp cellars into dry, usable storage space, the units are fitted with an auto-defrosting device and can be arranged for either automatic or hand control.

Housed in enamelled casings, with built in drip trays and fitted with castors if required, these machines incorporate a ¼ h.p. hermetically sealed refrigerating system and are capable of removing up to 30 pints of water per day depending upon the relative hu-

midity of the location. The units have overall dimensions of 1 ft. 1¼ in. × 1 ft. 10 in. × 1 ft. 4 in. high and are available for either 220-240 volts, 50 cycles, or 110-120 volts, 60 cycles, single phase electrical supply.

For higher ambient temperatures the machines can be supplied without defrosting.

Air dryer for low ambient temperatures.

Air Filters

Two main types of air conditioning filters—dry and "oil-wetted"—are made by Vokes, Ltd. The filters are of various types, each of which is suitable for some particular application. The *Microvee* dry fabric panel type air filter, for example, has an efficiency rating of 99·9% and will remove particles down to five microns or less in size. However, it cannot be used in locations where soft coal is burnt. Under these conditions a Vokes K600 *Kompak* is more suitable.

Single panel units of the *Microvee* consist of an outer sheet metal case with an inner casing which houses the filter element. This is a felted fabric, sewn on a wire gauze support and folded to form deep pockets. These are separated by spacers, so ensuring uniform distribution of airflow. The medium ensures a relatively low velocity as the air stream passes through, which not only causes larger dust particles to be deposited by gravity, but results in complete separation of the finer dust particles, which collect in a light film on the surface of the filter. As a result the operating costs are negligible.

Where a filter of an efficiency not so high is required, *Five Ply* filters are made in either dry or oil-wetted types. Another inexpensive semi-permanent filter is the *Multivee* dry type air filter, which can be cleaned easily and requires practically no maintenance. The *Three Ply* filters are on similar lines except that where the *Multivee* is a dry fabric semi-permanent type, the *Three Ply* is a permanent "oil-wetted" filter. Its element is composed of a layer of cotton gauze sandwiched between two layers of metal gauze, arranged in a uniformly corrugated form and housed in a light, strong metal surround.

The K.600 *Kompak* air filter is intended for use where severe dust conditions are encountered. The simple design—there is only one detachable part—is achieved by hinging together a series of wire frames or spacers. These frames are folded from either side alternately, one on top of the other, and at the same time are interleaved with a continuous length of replaceable filtering material known as *Filterdown*. The *Kompak* has a consistent efficiency rating of 99·9% based on the elimination of dust particles down to 5 microns. Each unit is rated to deal with 600 cu. ft. per min., the actual velocity of the air passing through the developed area of the filter is only 22·5 ft. per min., although the face velocity is 300 ft. per min. The initial resistance of a new unit does not exceed 0·15 in. water gauge.

Refrigerator Motors

All types of refrigerator motors can be supplied by the British Thomson-Houston Co., Ltd., including single-phase A.C. capacitor-start; two and three-phase A.C. and D.C.; stator and rotor units for hermetically sealed compressors, and light power, A.C. shaded-pole for fan duty.

Motors for conventional belt-driven compressors include a complete range of high-starting torque motors in accordance with B.S. 170, Appendix D. These are specifically designed for quiet running and are supplied with bases for resilient mounting. They can also be fitted with automatic re-set thermal overload devices.

Stator and rotor units for hermetically sealed compressors are available in sizes ranging from 1/12 h.p. to 3 h.p. for single-phase A.C. supplies, and from 1/6 h.p. to 3 h.p. for 3-phase A.C. supplies. The former may be of either the resistance split-phase or capacitor-start types to match the compressor starting characteristics. For single-phase A.C. units up to ½ h.p. a combined overload protector and starting relay of the current operated type can be supplied, while for the larger units a potential starting relay is available. Separate overload protection is required for 3-phase units and for the larger single-phase units.

A full range of single-phase A.C. shaded-pole fan motors has been designed for condenser cooling and other refrigeration duties. These are available for outputs from 3 to 35 watts.

Frozen Food Cabinets

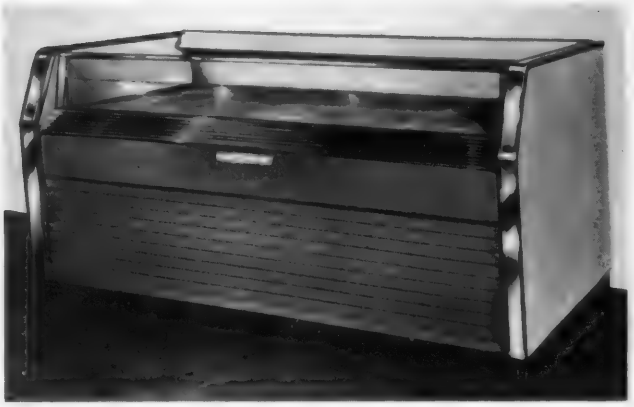
Hussmann British Refrigeration, Ltd., have recently introduced a new "Mass Display" range of refrigerated glass-fronted open display cases which are cooled by forced air circulation, with automatic defrost, giving very close control of the required temperature. The high temperature range is available in three temperatures, namely: 40°F. for fruit, vegetables, provisions, fats; 34°F. for English meat, fish, etc.; 28°F. for imported frozen and chilled meat.

Two of the important features are a low height of 3 ft. 1 in., plus a wide display given by the overall width of 3 ft. 8 in. The cabinets are trimmed with satin finish stainless steel and a special plastic metal laminate ripple front can be had in various colours.

A cabinet similar in outward appearance to the above is available for frozen food and ice cream. An important feature is that all these cabinets can be joined together to provide continuous display, with or without sliding doors, and where it is necessary to site the cabinets in a central position glazing can be had to one, two or four sides.

In addition to the new range Hussmann retain the OSD model, which is available in 4 ft. and 6 ft. lengths in two widths, 2 ft. 6 in. and 3 ft. These cabinets can be joined to form continuous display in multiples of the above lengths. The refrigeration, at 40°F., is provided by a large coil at the rear of the cabinet giving a gentle circulation of air.

Resiliently-mounted capacitor-start motor with automatic-reset thermal overload device.



New cabinet for frozen food.

Hussmann also supply cabinets for self-service stores, *e.g.* the 2DD and 2DM cabinets providing two refrigerated decks with a total of 12 ft. in a 6 ft. cabinet, and the OLT.7 and the LT.45, 7ft. and 4 ft. 6 in. in length respectively.

The above cabinets vary in price from £189 to approximately £600, delivered and installed with one year's guarantee and a further four years warranty on semi-hermetic condensing units where fitted.

German Refrigerating Machines

A brief review of modern German industrial automatic refrigerating machines reveals a number of quite distinctive construction features. Despite the incursion of *Freon*, many recent automatic ammonia refrigerating machines with piston compressor and one or more cylinders, have been designed to facilitate immediate shipping. This is done by having the foregoing items and motor built together into a frame and shipped with the requisite charge of oil and refrigerant so that it is only required to connect the machine on the site with the electricity and water supply. One model of this kind, using ammonia as the working medium, employs a condenser, of the double-tube nest type, installed beneath the outfit. This type has a performance of from 20,000 to 120,000 B.Th.U. per hr., where the drive is by electric motor with a high starting torque, and where the winding is protected against splashing water and damp. Most of these models use rubber V-belt drive.

Other vertical compressors using ammonia as the cooling medium generally have two cylinders, with the manometer and check valves mounted directly on the outfit. Machines of this variety are constructed for small industrial plants with performances of from 4,000 to 120,000 B.Th.U. per hr. and even higher figures, using from one to six cylinders and operated on the Uniflow principle.

Methyl-chloride refrigerating machines are also built with single-acting compressors with one, two, or four cylinders, where a water-cooled cylinder head is provided for the larger types. One model is equipped with a flat double-pipe condenser installed at the side of the unit, which can be readily dismantled for cleaning, and has a performance of from 900 to 160,000 B.Th.U. per hr. A recent model of sulphur dioxide automatic refrigerating machine is equipped with a specially designed rotary compressor. A cylindrical rotor is eccentrically mounted on the shaft, which successively touches the whole of the inside circumference of the cylinder surface as it rotates in the horizontal cylinder. By means of a yielding radial partition, disposed in the stationary cylinder between the suction and pressure ports, the suction and pressure compartments thereby produced are separated. Rotary compressors of this type can be driven at fairly high speeds, and can be direct-coupled with an electric motor as a consequence. The performance of this model ranges

from 900 to 160,000 B.Th.U. per hr. Another automatic refrigerating machine in which the refrigerant is ethyl chloride is also equipped with a rotary compressor. This machine is often used in dairies, but is also built for various alternative purposes. The evaporators differ greatly according to the services which they are intended to provide. One of these, which is very compact, has an evaporator in the form of a trickling cooler, and the export model for cooling milk is claimed to deal with approximately 22 gal. of milk per hr.

Where a regular supply of ice is difficult, *i.e.* in the tropics or in small country settlements, etc., ice-making machines have been specially developed.

Refrigerating units of this kind produce crystal-clear ice. They contain a number of vertical ice cells which are open at the top and bottom, and the jackets of which are flooded by the refrigerant, which is usually methyl chloride or ammonia. The water is maintained in lively circulation within the cells so that even if it contains impurities the ice becomes perfectly clear.

When the ice in the cells has attained the desired thickness, the evaporator is connected to the pressure-end of the compressor so that the compressed vapours rush into the evaporator flooded with the liquid refrigerant. In this way, the latter is driven out into a collecting tank and condenses on the outer walls of the cell units. The surface of the ice blocks is thawed where it touches the walls, by the heat liberated in the condensation, so that a negligible loss of ice is sustained. The ice blocks are impelled upwards by the buoyancy, upon which the circuit of the refrigerant is changed again and the liquid made to flow into the evaporator so that the refrigerating process can begin afresh.

Service applications

Refrigerators can thus be utilised to purify water by freezing out impurities and in the same way freeze water out of unsaturated aqueous solutions. This relates on the one hand to sea water and other impure waters, and on the other to vinegar, fruit juices, and similar materials. Small automatic refrigerating machines, with air-cooled condensers for cooling drinking water, besides cylindrical types for wall attachment, have also been constructed.

Air Conditioning

"Visco" ventilation plant in the lactic cheese department of Aplin and Barrett, Ltd., Yeovil, manufacturers of "St. Ivel" products. This view shows the plant itself consisting of the centrifugal fan on the intake side of which is fitted the sheet steel casing containing the "Duplex" filter and tempering air heater battery. The fresh air intake duct can be seen passing up through the roof from the top of the casing. In the background can be seen part of another "Visco" ventilation plant installed some years ago.

Clean Air and Cool Water

Pure dust-free air and a plentiful supply of cool water is obtainable through the use of their equipment, according to Visco Engineering, Ltd., specialists in air filtration, ventilation and air conditioning. In some cases a steady supply of clean air may be ensured by a comparatively simple apparatus such as an air filter and electric fan. In other cases, where it is essential that the air should be of the same temperature and humidity day and night, summer and winter, much more elaborate equipment is required. Equipment for complete air conditioning of this nature may include air filters of a suitable type and size, air filtration, ventilation and air coolers with the necessary fans and electric motors, all controlled by automatic devices for bringing the various apparatus into action at the right time.

Plentiful supplies of cooling water are necessary in most food factories for use with refrigeration equipment and process work. This water may be wasted through being used once only and then run down the drain. Visco claim that about 97% of this water could be saved by installing their steel shell forced draught water cooler. With this, the water is continuously recirculated, the only loss being a mere 3% by evaporation.

The installation of a cooling unit of this type also makes the manufacturer less dependent on public water supply and removes the risk of a "mix" being spoiled by the water being cut off at the main during a dry spell. The units are available in many sizes.

A forced draught cooler and pump to handle 1,000 g.p.h. can be obtained for about £275 and can save about £198 a year, according to Visco.

THE GROWTH OF REFRIGERATION

By Ben Quarmby, A.Inst.R.

Here is a brief survey of the development of refrigeration for food preservation, in which credit is given to some forgotten pioneers of this art and science.

OF all known methods of preservation, refrigeration is the least objectionable in the sense that it adds nothing to foods, and removes nothing from them—only heat. Over 2,000 years ago men found that foods kept longer in cool caverns or partly immersed in a running stream packed in a suitable vessel. The use of deep wells for food storage is also recorded.

Francis Bacon, the famous seventeenth - century philosopher and scientist, acting on impulse, stepped from his carriage and crammed snow into a dressed fowl he had just bought. This experiment may be looked upon as a forerunner of refrigeration, and it is regrettable that Bacon's conclusions are not available, as he caught a chill as a result of his impulse and died the following month. That heat could be absorbed by the evaporation of water was known to the ancients, who used unglazed pottery for holding water, which percolated through the vessel causing a dewiness on the outside. Surface evaporation was thus produced, the heat necessary for this being drawn in great part from the water within, thus producing cold. Early butter and milk coolers operated on this principle, and indeed they are still used.

Natural ice

The practice of harvesting natural ice and storing it for later use first suggested the need for the mechanical production of ice, which was, in fact, the first application of mechanical refrigeration when it was introduced much later. There is no doubt of the very early use of natural ice to preserve food, but for centuries it was something of a luxury, available only to the very rich and used principally in cooling drinks or preparing desserts, until well into the eighteenth century.

A writer in *De Bow's Review* in 1855 claimed that ice was an American institution and a luxury, and that in Europe its use was confined to the wine cellars of the rich, and the cooling pantries of first-class confectioners. It is known, however, that natural ice was harvested near St. Petersburg, and was in fairly common use by the peoples in that city, as it also was in many towns and cities in Norway and Sweden.

The use of natural ice appears to have become quite common in the New England States of America in the second half of the eighteenth century, and there are many records of the then used ice-houses, in which meat, butter, and other perishables were stored. The well-known ice-chest made its appearance about 1803, but it lacked insulation and was of poor design. The advantage of having the ice compartment above the food storage space to make use of air flow by natural convection does not appear to have been generally appreciated until the middle of the century, but this elementary ice-chest is important as it paved the way for the use of ice by city dwellers.

Ice shipments from Boston, U.S.A., to Great Britain began around 1840, but American ice was driven off the market in London soon afterwards by the keen competition from Norway. The peak year of American shipments was 1860, when they amounted to nearly 150,000 tons. Soon after shipments began to decline for the reason mentioned, but there was still a small trade in 1900, when 14,000 tons were exported. Ice still came into this country from Norway and Sweden for some time after this, but gradually shipments declined and ceased altogether when the first mechanical refrigerator plants began to manufacture ice blocks, which even today still find many uses.

Mechanically produced ice

In 1755 William Cullen produced artificial ice for the first time by evaporating water in a vacuum. In 1810 an absorber was added to Cullen's machine by Leslie. In 1757 latent heat was discovered by Black. A more exact experiment on the chilling of air by expansion was made in Sweden in 1771 by the German scientist Wilcke. Priestley did some work on vapour absorption by liquid in 1774. In 1807 Dalton and Gay-Lussac saw in the mechanical expansion of air a means of refrigeration, and Carnot also had a clearer conception of this in 1824. About this period Faraday had liquefied various gases.

The working principle of a cold air machine was explained by Richard Trevithick in 1828, and by Herschel in 1834. The first machine of this kind was built by the American John Gorrie in 1844. It was far from perfect, and was improved in 1852 by Rankine, and in 1857 by Sir William Siemens. The vapour compression machines came later, based on the earlier findings of Cullen and Black. Contributors to this growth were Cavallo in 1781, Oliver Evans in 1805, and Mercer in 1813. The first rather primitive continuous cycle compression machine was built by Jacob Perkins in 1834 on the basis of British Patent No. 6662; ether was the refrigerant. Carbon dioxide was first solidified in 1835 by Kemp and Thilorier.

The first cold air machines were introduced by Gorrie in 1844, and improved by Rankine in 1852. Further work on this type of machine was done by Allen in

America, by Windhausen in Germany in 1869, and by Giffard in France in 1873, and in this country by James Coleman, together with the brothers John and Henry Bell. In America Twinning also began to work with ether in 1848, and was granted a British patent in 1850. By far the greatest advance in the development of vapour compression refrigeration machines was made by James Harrison, a Scottish engineer who emigrated to Australia.

In 1856-57 he applied for his British patents, in which he still used ether as refrigerant. The construction of his machine was undertaken in this country by Siebe Brothers, and in Australia by Russell and Co. By 1860 these machines were manufacturing ice in England, Scotland and Australia, and met with great success. James Harrison is thus described as "the father of refrigeration," and has been paid a grateful tribute by the whole refrigeration industry in the recent centenary celebrations in Australia. Modern refrigeration continues to make progress, and there are no signs that it has passed its zenith.

Quick-freezing

Quick-freezing is rapidly assuming a position of major importance in the preservation of foods. Quick-freezing suggests the name of Birdseye, the inventor of the most widely used method. The late Clarence Birdseye, acknowledged as one of America's leading authorities on food, was responsible for a system of preservation by multiple quick-freezing which has been described as "one of the most exciting and revolutionary ideas in the history of food." While in Labrador in 1917 he first became interested in the application of sudden intense cold in keeping foods. After some years experimenting he perfected his process in 1925, and four years later in 1929 the first commercial pack of quick-frozen foods was marketed under the Birdseye label.

Others in America working in this field at the same time as Birdseye were Ottesen, Taylor, Stuckey and Sharp, and the Norwegian refrigeration expert Rech, who invented the *Sacip* system of quick-freezing which is a combination of cold air and brine. In this country the first quick-freezing plant was put into operation in Liverpool, when a variety of foods quick-frozen by the "Z" process which makes use of a finely atomised spray of chilled brine through which the foods are passed, were shipped to Australia, and also to three points in America. It was reported in all instances that the foods arrived in excellent condition. This demonstrated the commercial practicability of the "Z" process, and resulted in the installation of a complete "Z" system in Chicago. The inventor of this system (M. T. Zarotscheneff) claims that with the application of finely atomised brine, either direct or indirect, quick-freezing can be accomplished faster and more cheaply than any other quick-freezing system.

In this rapidly growing aspect of food preservation, the microbiologist will play an increasingly important part in conjunction with the refrigeration engineer. The enormous number and variety of foods to be quick-frozen requires special study of the influence of freezing temperatures on micro-organisms, the influence of the rate of freezing, the freezing death of bacteria, the occurrence of bacteria in frozen foods, pathogenic bacteria in frozen foods, and in the general chilling, hygiene and practical aspects of each variety of food to be dealt with. As this covers an exceptionally wide field, without some co-operation between interested parties progress will be slower than if, as has already been suggested, it was co-ordinated through a special Institute of Industrial Microbiology.

Ice cream

A great step forward in the application of mechanical refrigeration to the ice cream industry was the introduction of the first direct expansion freezer in 1914. From then on progress was centred on the continuous freezer, one of which the *Vogt*, was first installed commercially in Britain in 1927. The Creamery Package Company's continuous freezer then appeared in 1935, and this machine has done much to place the ice cream industry on a large-scale production basis, allowing the continuous production of a high quality product.

The rapid rate of freezing in the continuous freezer produces microscopical ice crystals in the mix, and the cream is at its smoothest texture when delivered from this freezer, although it is only half-frozen. Completion of the freezing is done in the hardening room, where the rate of freezing is much slower. The refrigerated tunnel has been a great advance on the hardening room, producing more rapid freezing in less time, thus helping to produce a finished product of smoother texture.

Further progress in this industry would appear to depend upon refrigeration being able to produce short-period rapid freezing at least equal to that in the continuous freezer in the second phase of the complete mix freeze.

Other methods of food preservation

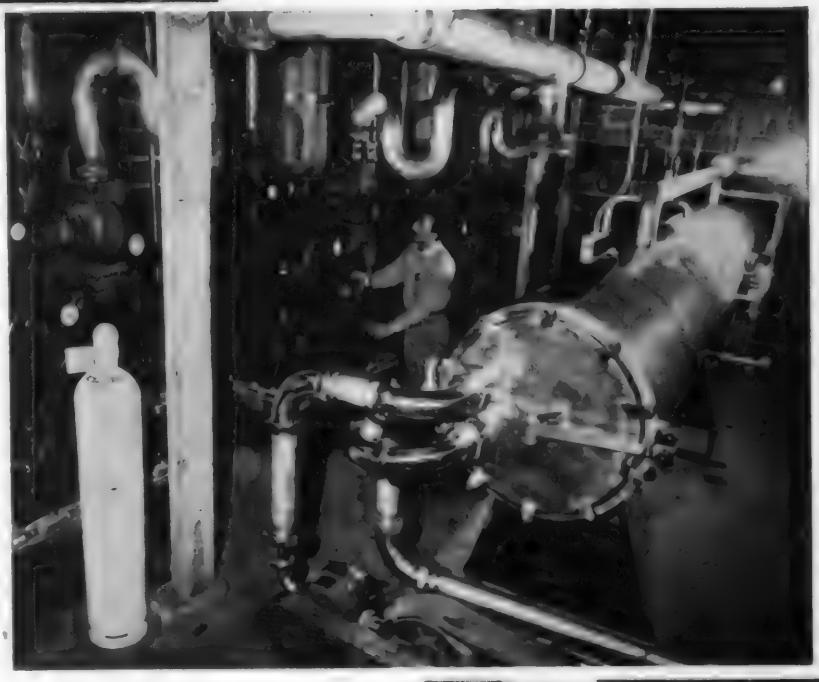
Experiments with the mercury injector refrigerator took place in the U.S.A. in 1932. This system is a two-stage gas-fired method using mercury injected from a jet at a speed of 1,200 ft. per sec. to entrain water and lower its temperature by means of an evaporator in the jet chamber. There are no moving parts, and the method is essentially low-pressure. The largest unit has a refrigeration capacity of 2 tons, and thermal efficiency is 42 %. There would appear to be difficulty in obtaining low temperatures, and the method does not appear to threaten established mechanical refrigeration technique.

Experiments in preserving foods by ionising radiations have been much publicised, but this technique raises many problems and results so far are inconclusive.

ORANGE JUICE TANKER

Refrigeration plus insulation keeps juice fresh on 56-hour sea trip

CARRYING a cargo of fresh orange juice equal to 217 refrigerated truckloads, the 8,000 ton converted cargo vessel s.s. *Tropicana* will ultimately save her owners, Fruit Industries Inc., of Florida, U.S.A., nearly a quarter of a million dollars per shipment in transport costs.



480 tons of refrigerant

As soon as it leaves the Florida company's 65 squeezing machines the juice is chilled to 28°F., using *Freon*-12 refrigerant. While the juice is waiting to be pumped into the ship's 650,000-gal. stainless steel tanks, it is held temporarily in one of the largest cold stores in Southern America, cooled by 480 tons of refrigeration.

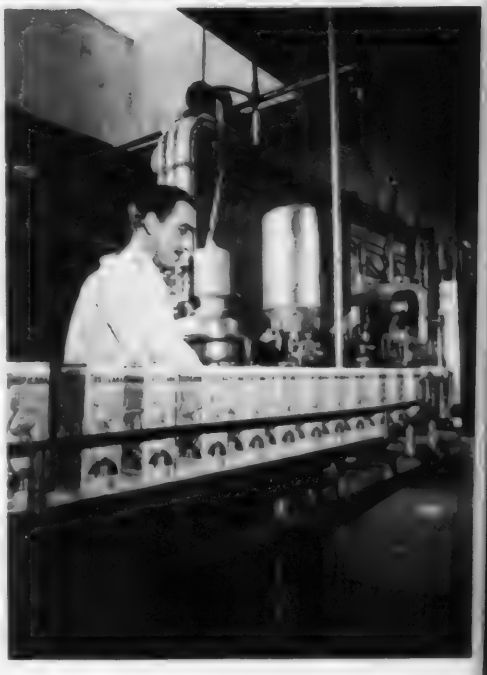
Heavy insulation around the tanks keeps the temperature of the orange juice down to a safe 28-30°F. on its 56-hr. journey north to Long Island, New York. To assist in insulation the ship has been enamelled white, reflecting the sun's rays and at the same time maintaining an attractive appearance.

Once the *Tropicana* docks, another refrigeration system chills the juice as it is pumped into storage tanks, and holds it at 28°F. until it is packaged. Cartoning machines, with a speed of 140 per min., fill both quart and half-pint cartons, the latter distributed through vending machines in schools and offices.

Flavour and vitamin content

Intensive tests have shown that the juice retains its flavour and vitamin C content. Neither quality showed a measurable decrease after four weeks of storage at 32°F. The company uses *Freon*-12 for cooling because they have found it odourless and virtually non-toxic.

Fruit Juice Industries started marketing fresh orange juice in cartons in 1954. Future plans include the installation of additional stainless steel tanks to the *Tropicana* to raise its cargo capacity to a million and a half gallons, and ultimately they hope to ship fresh juice to Europe.



Above: **After its 56-hr. voyage from Florida, the orange juice is pumped to this packing plant and held at 28°F. by "Freon-12" refrigerant.** ***Right:*** **Filling cartons with fresh orange juice at a rate of 140 cartons per min.**

Photographs courtesy of E. I. du Pont de Nemours Inc.

INSTRUMENTATION FOR REFRIGERATED STORAGE

The efficient preservation of food by cold storage requires highly accurate control of temperature, humidity and atmospheric composition. Recording and control instruments for this purpose are described here.

COLD storage plants for fruit in which conditions are automatically controlled within the storage space require reliable instruments. The same applies to transport of perishable foodstuffs, such as meat over long distances, *i.e.* aboard ship.

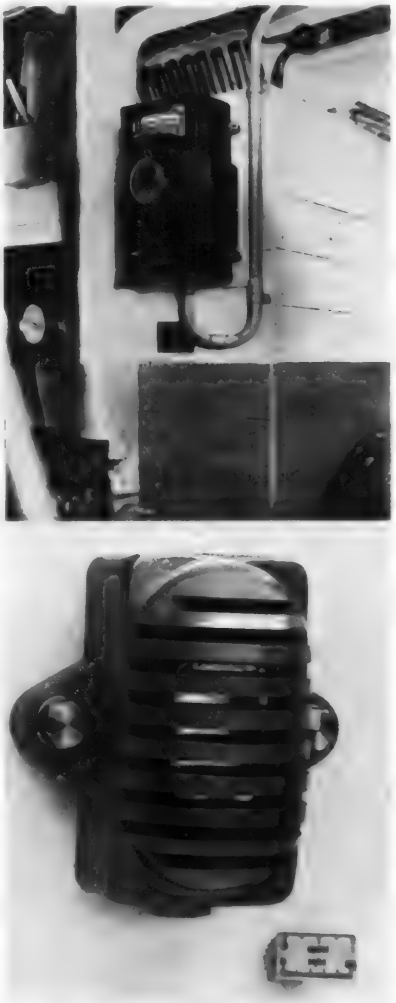
Refrigerated gas storage for fruit is now extensively used in apple-growing districts in Britain.

The fruit is stored at low temperature and the content of oxygen and carbon dioxide in the atmosphere of the chamber is closely controlled. The CO_2 is produced by apples during storage, and no special CO_2 producers are required. For meat storage, however, CO_2 has to be supplied.

For gas refrigerated storage the following measuring instruments are required: (1) Temperature measuring instruments. Electrical distance thermometers are mainly used, as these enable several storage temperatures to be read from a central instrument panel. (2) Humidity meters are required so that the storage is kept at desirable relative air humidity. Electrical or mechanical (hygrometric) methods may be used for humidity measurements. (3) Oxygen and CO_2 analysers are required to measure the composition of storage atmosphere. Electrical CO_2 meters are favoured.

Temperature measurement

Electrical distance thermometers used are of the resistance type. Change of room temperature varies the resistance of a wire carrying a low electric current from a battery. This change is proportional to the change of voltage, and an indicator or recorder, calibrated in temperature units, is applied for measurement. Fig. 1 shows an electrical resistance thermometer installed aboard ship. A selector switch enables the person in charge of the refrigerated holds to select any point for rapid temperature indication. Fig 1A illustrates the room thermometer, protected by a casing. The wiring leads from the instrument to the multi-point temperature indicator at a central location.



Cambridge Instrument Co. Ltd.

Fig. 1. Electrical distance thermometers measuring hold temperatures on s.s. "Californian." *Below:* **Fig. 1A. Air thermometer unit for exposed conditions.**

Aboard ship the measurement in various points of the hold containing the gas refrigerated cargo is more difficult. Fig. 2 shows a thermometer phial, approved by Lloyds' Register, for suspension on cable in various locations of the cargo.

Humidity measurement

The preferred system for measuring the relative humidity of air is the "wet and dry bulb" thermometric system. This measuring method is based on the following arrangement. If two identical thermometer bulbs are exposed to room air, which is blown by a small fan over their surface, both will give readings from the same thermometer. However, if one bulb is kept wet by means of a wick which moistens its surface, and the other bulb is dry, a so-called psychrometric temperature difference will appear between the two temperature readings. This differential is proportional to the humidity content of the room air at the temperature indicated, and is used to indicate or record relative humidity on a humidity instrument.

One of the latest developments in electrical humidity measurement incorporates automatic compensation for room temperature changes which, its makers claim, makes readings very accurate. Fig. 3 shows an instrument panel designed for apple stores, etc., and measures storage room temperature (dry bulb) and also humidity (wet bulb). The makers, Elliott Brothers (London), Ltd., claim that the instrument may be located in any convenient central position, multi-way coverage of distant points of measurement being arranged by means of lever-key selector switches. The model illustrated is fitted with three 2-way

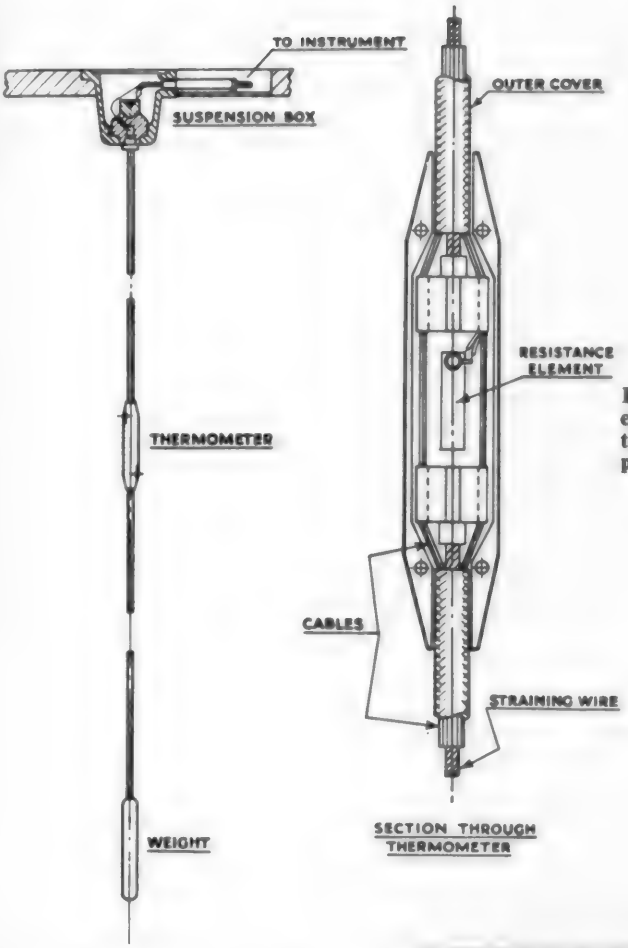


Fig. 2. Elliott electrical resistance thermometer suspended on cable for ships' holds.

switches mounted in the lower part of the case front and covering six channels. A maximum of 18 channels may be accommodated, requiring nine 2-way switches for selection.

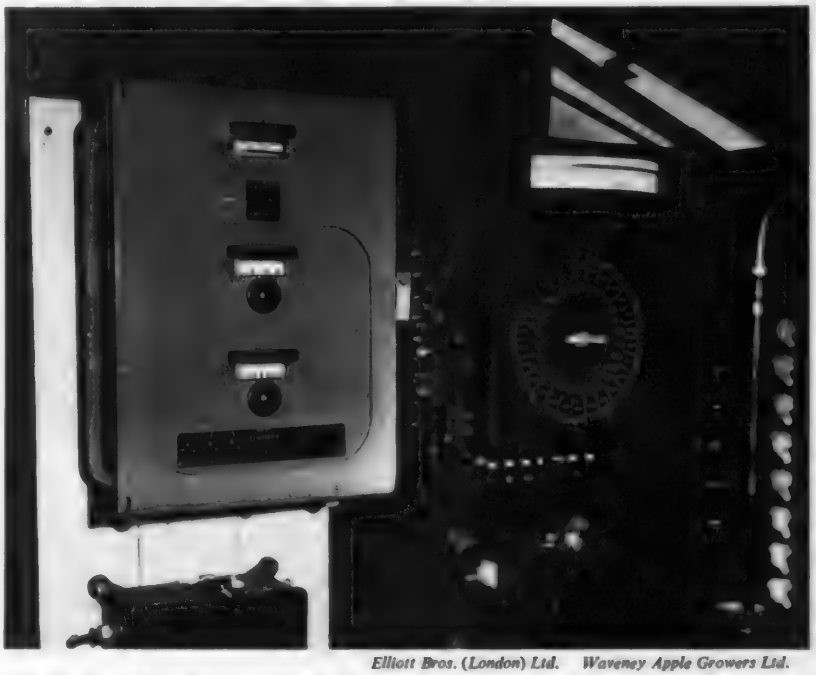
When establishing the "dry-bulb" temperature as a preliminary to taking a relative humidity measurement, a 2-way switch in its "temperature" position connects the dry bulb to a Wheatstone bridge. This bridge is balanced by rotation of a knob operating a sliding resistance, the rotation causing a coupled temperature indicating scale to give a direct indication of temperature. Rotation of the "temperature" knob also varies the setting of a potentiometer included in the humidity measuring circuit (another Wheatstone bridge) thus providing automatic compensation for temperature variations which, by permitting the indicator to give R.H. readings correct at any temperature within its range, forms one of the most important and valuable features of the instrument.

When the 2-way switch is moved to its "humidity" position, both wet and dry bulbs are connected in the second bridge circuit. A "humidity" knob operates a second sliding resistance which in turn is coupled to the R.H. indication scale, so that when the bridge is again balanced, the R.H. reading may be taken directly from this scale. A 6-volt d.c. power supply is required for the operating current.

Measurement of CO_2 or oxygen

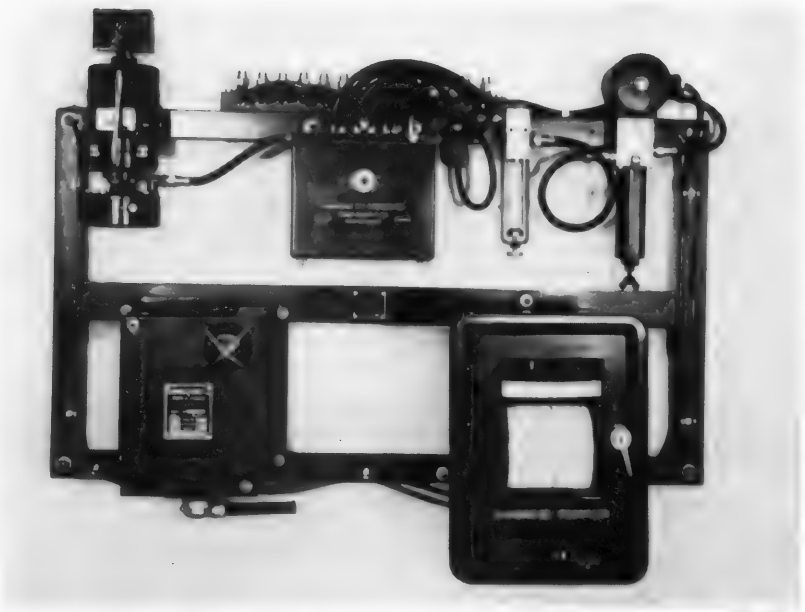
For gas refrigerated storage electrical instruments are used. They are based on the physical fact that a heated platinum wire changes its resistance to electrical current according to its surrounding atmosphere. This phenomenon is utilised in analysers, whereby a platinum wire under current in a small enclosure is exposed to samples from the storage atmosphere.

Similarly, the oxygen content of storage gases can be measured.



Elliott Bros. (London) Ltd. Waveney Apple Growers Ltd.

Fig. 3. Elliott instrument panel in apple store installation showing selector switches for each of six chambers and a rotary selector switch for central, lower and upper sections of each chamber.



Cambridge Instrument Co. Ltd.

Fig. 4. Carbon dioxide recorder for fruit stores.

The principle is to burn a sample of storage atmosphere in a small tube containing a carbon rod. The oxygen is converted into CO_2, and the latter is measured as mentioned before. By means of a conversion chart the actual oxygen content of storage can be obtained.

Cambridge Instruments, Ltd., of London have available a combined oxygen and CO_2 equipment with indicating or recording instruments. The analyser is located in a ship's hold and connected by electric cable to an indicator which shows the percentage of oxygen and CO_2 in the atmosphere of the spaces concerned.

The meter contains two identical spirals of platinum wire enclosed in separate cells in a metal block. One of the cells contains pure air, while the other is open to the atmosphere in the space concerned. The spirals form two arms of a Wheatstone bridge circuit. When an electric current flows in the circuit, the spirals become heated and lose heat to the walls of the cells, the temperatures of the wires (and, in consequence, their electric resistance) depending on the thermal conductivity of the gases surrounding them. Changes in the CO_2 content of the air in the compartment result in changes in the conductivity of the gas surrounding one of the spirals, and consequent movement of the galvanometer pointer.

The galvanometer may be arranged to indicate or to record directly the percentage of CO_2, the usual range being from zero to 20 to 25%. The addition of a temperature scale, allows one instrument to be employed for both temperature and CO_2 percentage.

For spot tests on board ship, portable CO_2 indicators have been developed; such instruments enable those responsible to adjust the ventilation of fruit cargoes so that deficiency of oxygen or excess of CO_2 may be avoided.

The layout and installation of instruments requires considerable experience. It is also important to keep instrumentation in good working order by regular checking and servicing. If this is done, gas storage condition can be maintained constant, as desirable, with little variation between the various storage locations, *i.e.* top or bottom of the gas store. Optimum temperature, humidity and CO_2 or O_2 conditions for each type of stored food have been found by extensive research, and efficient instrumentation will assist to maintain these conditions. Data and advice may be obtained from the Food Investigation Board of the Department of Scientific and Industrial Research, and from specialised consultants and instrument makers.

"COF" in Frozen Fruits

No simple or easy explanation has been offered yet for the "COF effect" in frozen citrus products. This is characterised by a "tallowy" taste, a cardboard or castor oil-like odour and is sometimes known as "citrus-oxidised flavour." After considerable research workers at the American Can. Co. conclude (J. S. Blair *et al.*, *Food Technology*, 1957, **11** (2), 61) that physiological immaturity is the main cause. Both tallowiness and bad odour are believed to be of biochemical origin and represent stages in the biosynthesis of lipid from sugar — which is most active in immature fruit. Although the effect is modulated by the redox level, the odour is not believed to be related to actual oxidative disruption of fats, but to the odorous components which characterise unrefined vegetable oils in general, which are products of the same biosynthetic processes that produce the fats themselves in plants. The α-β-unsaturated aldehydes constituting at least part of the malodor are present, not because some of the fats have been oxidised, but because the biochemical conversion of sugar to fatty acid has failed to go to completion.

This lipid biosynthesis may be significant not only for frozen citrus but for frozen vegetable products as well if these are insufficiently blanched. Since in the case of citrus it is impossible to blanch and subsequently to eliminate the products of the enzymatic action which takes place during blanching, the best course would be to await the attainment of that stage of physiological maturity in which the enzymes are relatively dormant. A measurement of respiratory quotient might afford a useful criterion of physiological maturity.

AIR TREATMENT PLANTS

By Leo Walter

The selection of efficient air conditioning plant is essential in the modern food factory where good ventilation, heating and humidity control are at a premium. Here is an account of some developments in air conditioning equipment with hints on how to choose the right plant for the job.

THE food industry requires air in many different forms—heated, cooled, sterile, humidified, de-humidified, dust-free, filtered, and so on. In recent years considerable progress has been made in the design and application of air treatment plants, and although the installation or improvement of these plants is a job for experts, it is useful for food plant managers to have some knowledge of the fundamentals of air treatment in order to properly express their requirements.

Ventilation

Progress in space ventilation centres on better fan designs, which are more efficient and less noisy than their predecessors. Control of driving motors has been improved. Better cleaning facilities for fan housings and air ducting are standard. Special fans made from P.V.C. are now on the market; these are corrosion and acid resisting. Bifurcated fan designs may be inserted right into an air duct, thus saving space. Better designs of axial flow fans are in use for exhausting vapours from boiling pans, etc.

Space heating

Progress in space heating has been less vigorous. There is a wider use of invisible panel warming or radiant heating systems, using hot water or steam coils in floor, ceiling or wall sections because they are more hygienic than radiators or baseboard heating systems, having no exposed heating surfaces for dust or bacteria to settle upon. Where electricity is cheap electric heating cables are often buried in the floor.

"Sirocco" cooling plant in a jam factory.

Filtering

Progress in air filtering centres on the wider use of electrostatic filters. They are now built in smaller sizes for efficient extraction of minute solid particles. Mechanical air filters use glass wool or throw-away glass fibre elements in place of textiles.

Air conditioning

Modern air conditioning plants are designed to be very flexible, and under fully automatic control. In some instances, small individual air conditioning units replace central air conditioning plants with ductwork. Units can be conveniently located in the conditioned room, or adjacent, and have either no air ducts at all, or very short runs. Lately, central air conditioning plants have been developed using higher air velocities and duct-work of smaller area, thus saving space, material and cost. New electronic controls produce better gradient control of temperature and humidity, instead of crude on/off control with inevitable fluctuations of the control valves. The use of better designed refrigeration equipment allows for improved cold storage of foodstuffs, especially meat.

Application of air conditioning is widespread today in labelling and packing departments. The modern bakery maintains air conditions on a scientific basis in dough mixing rooms, proof boxes, and for storage of flour. Controlled air is advantageous in bacon preparation for curing, in cutting and pickling rooms and soaking rooms. In meat product manufacture, rooms for hanging, boning, trim-

ming and cutting, curing, mincing, etc., have to be kept at suitable air conditions. Storage of finished products requires cooling and drying of room air. The dairy industry makes wide use of air conditioning. Sweet confectionery and chocolate manufacture require refrigeration and air conditioning in many processing departments.

General points

The above notes can only give a very broad picture of plants available in improved design forms. The potential user will be well advised to entrust only manufacturers of repute with planning of a new plant. The name and reputation of the supplying firm is worth more than any written guarantee. To go and see similar plants in actual operation is obviously desirable, but management should realise that what might work well in one plant can be less efficient in another. There are scarcely two plants identical, even when producing the same commodity. Local conditions may vary to such an extent that completely different methods of air treatment might be advisable, requiring greatly differing equipment.

Finally, a word of warning on the installation of a "home-made" plant. What may be saved on one side can be wasted money if the plant misbehaves. Similarly, "home-made" driers can be monstrosities. Most air treatment plants have the peculiarity that in practice the air does not always follow arrows of flow in blueprints. Air follows the law of nature to seek the path of least resistance. No matter what an inexperienced designer puts into a blueprint, air will react and flow as it must, and not otherwise. Rather than take risks, progressive plant management will be well advised to co-operate with a reputable maker of air treatment equipment. The procedure should preferably be as follows: invite 2 or 3 reputable suppliers to tender; state all your requirements from the processing angle clearly and leave no doubt that tests will be required to prove plant efficiency before payment; ask for guarantees, but do not overdo this point, otherwise it might add unnecessarily to expense. For larger projects, employ the help of an unbiased expert. He might spot weak points in the submitted tenders, and demand their rectification. Although more expensive than another, a scheme might deserve consideration because it not only uses generous dimensions, but also leaves room for increase of load at a later date. A very low-priced tender may be looked at with some suspicion. To buy on price alone is a great mistake.

"Canned Foods" Revised

By the time a book reaches its fourth edition* and has become as firmly established as this one has, there is very little left for a reviewer to say, unless the author has been unusually careless in his revisions. Mr. Baumgartner has never shown any sign of carelessness, his book has been a model in many ways right from the start, and now that he has been joined by Mr. Hersom, the partnership appears to have followed the well-established lines. In short, the pattern of the book remains much as it did in its third edition, but the signs of thorough revision are not hard to find; at a rough estimate about one-third of the many references are to papers dated 1950 or later. No new chapters have appeared in this edition, but the size of the book has been increased by about one-tenth by adding more pages and by increasing the page size; this, then, is a measure of the additional modern matter which has been incorporated.

There can surely be very few people who are in any way connected with food technology who have not already seen this book in one or more of its previous editions. To those few it may be said that the book is well known as an authoritative text-book which is eminently readable and thus suited to the non-bacteriologist as well as to the specialist; its readability is typified by its title, which a more stodgy author would have put the other way round. This new edition will certainly not detract from its reputation in any respect. As for the rest—probably the mere announcement of a new edition is sufficient to set them ordering a copy.

Denis Dickinson.

* *Canned Foods: An introduction to their microbiology.* By J. G. Baumgartner and A. C. Hersom. 4th Edn., 1956. J. and A. Churchill, Ltd., London. Pp. 291. 21s.

Tapioca and Cassava

The processing of tapioca flour is broadly described in a new FAO Agricultural Development Paper.* Baked tapioca products—partly gelatinised tapioca flour in forms known as flakes, seeds and pearls—are extensively used for the manufacture of soups, puddings, salad dressings, etc. In recent years improved gelatinisation techniques have produced very uniform grist-like commodities.

The source of tapioca flour is cassava which, for many years, has been a popular source of food in tropical and some sub-tropical countries because of the relative ease with which it can be cultivated and processed. Tapioca flour, made from the tubers of this plant, might well be called a starch because of its low content of non-carbohydrate constituents.

This publication deals with the essentials of tapioca flour processing and provides technical information and descriptions of machines and other accessory equipment. They range from primitive hand- and foot-operated devices to comparatively elaborate power-driven mills and bolting installations. The manufacture of seeds, pearls and flakes is described and some essential methods of analysing cassava and tapioca as well as important applications of tapioca flour are also included.

* *Processing of Cassava and Cassava Products in Rural Industries.* By L. W. J. Holleman and A. Aten. FAO Agricultural Development Paper No. 54, 1956. H.M.S.O. 7s. 6d. net.

Bacteriology of Canned Fish–2

By Hans Riemann*

Last month the author discussed some of the bacterial causes of spoilage in canned fish. In the concluding part of his article he describes microscopic and other methods of examination and discusses the interpretation of results.

MICROSCOPIC examination of the contents of the can is an important part of the examination. Information with regard to preprocess spoilage and autosterilisation may be obtained in this way, although it is often difficult to detect cells in autosterilised cans.

A wet mount examined by phase contrast microscopy is usually sufficient. If many bacteria (*i.e.* more than one per field) are present and no growth is obtained by subculturing from the can, it is desirable to make a microscopic count, employing the same procedure as the Breed count used for milk.

Bacteriological examination should be supplemented with other methods of examination. This is especially important when the bacteriological examination does not give clear-cut results. The smell and appearance of the can contents must be recorded and the *p*H preferably measured. It is common experience that the smell of the contents judged by an experienced person is the most sensitive spoilage test, next in order probably comes measurement of *p*H and bacteriological examination. Chemical tests might be useful but must be standardised for each individual product. Analyses of the gas present in the head space may sometimes be of help. A method suggested by Moller and Jul[17] is worth mentioning because it allows a distinction between cans blown because of leakage and cans blown from underprocessing without bacteriological examination, and it is the only reliable method for detecting leakage when chlorinated cooling water has produced an infective flora consisting of spores only. The method requires a number, preferably at least 10, of blown and non-blown cans from the same lot. The seam length of the cans is measured, and after emptying and cleaning the cans a pressure test is performed and the pressures by which the cans leak are noted. Eventually the quality of the seam is examined by tearing off the rim of the cover as described by Baumgartner.[1] The examples in Table 2 show the results of two examinations. In both cases the contents of the cans were spoiled.

Table 2. Distinguishing between under-processing and leakage by seam examination.

	Mackerel in tomato *Can size: ½ club*		*Tuna in tomato* *Can size: ½ dingley*	
	16 blown cans	*10 non-blown cans*	*22 blown cans*	*10 non-blown cans*
Leak at kg./cm.² (average)	0·02	>2·7	1·9	1·7
Greatest seam length in mm. (average)	4·3	3·9	3·9	3·9
Cause of spoilage	Leakage		Underprocessing	
Bacteriological check	10 cans with many cocci and different rods 10 cans with few	No bacteria	20 cans with clostridia 2 cans without living bacteria	No bacteria

Interpretation of results

The following discussion of the interpretation concerns only the examined cans. The conclusions which could be drawn with regard to the lot from which the cans were drawn will be discussed later.

On drawing conclusions from bacteriological examinations, the results of the other examinations should be taken into account. Obviously, the contents of a can are unfit for human consumption if it is spoiled even when bacteria are not detectable. On the other hand, an organoleptically sound can cannot be regarded as edible if it contains large numbers of dead or living bacteria. The interpretation of these two cases is not difficult. Neither is it usually difficult to distinguish between leaky cans, underprocessed cans, or cans swelled by chemical action, but it should be noted that it is always desirable to examine a number of cans, preferably at least ten.

Commercial sterility

The difficulties in interpretation arise when one has to deal with organoleptically sound cans which contain moderate numbers of dead bacteria and/or a few living bacteria. It is well known that organoleptically sound canned food may contain living bacteria which has led to the formulation of the term "commercial sterility." A better term would perhaps be "commercial stability." In oil packed products, bacteria trapped in the oil-phase are prevented from multiplication which may be regarded as a typical example of commercial sterility. The literature contains many papers reporting the presence of bacteria in sound canned fish. Cheyney[18] reported 8% of cans, including canned fish, to be unsterile (presence of spore formers). Savage[19] reported 100% of canned crabs to be unsterile. Fellers[20] found 3·4% of canned salmon unsterile; most of the unsterile cans contained

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very few bacteria. These papers may, however, over-estimate the occurrence of bacteria in sound canned fish. First, some of the positive results may be due to chance contamination of the media. Williams and Clark[21] found that 25-30% of the control plates were contaminated during sampling of canned foods. Secondly, as Tanner[9] points out, the standards of hygiene and heat processing in the canning industry at the time when some of their earlier investigations were made, cannot be compared with conditions today. Despite these two reservations there is no doubt that sound canned fish, even such products which do not contain spore inhibitors in effective concentrations, on rare occasions may contain a certain number of living bacteria. Fat protection is probably active in oil-packed fish as demonstrated by Lang.[22] Most food microbiologists can probably agree with Baumgartner[1] in his views on "commercial sterility."

Interpretation of bacteriological examination

The interpretation of bacteriological examinations of pre-incubated canned fish may be summarised as following:

1. *Many bacteria present*

1·1	sporeformers ..	underprocessed
1·2	others	leaky
1·3	microscopically, only ..	preprocess spoilage, autosterilisation

2. *Few bacteria present*

2·1	sporeformers ..	commercially sterile	contaminants?
2·2	others	commercially sterile	contaminants?
2·3	microscopically, only ..	commercially sterile, autosterilisation?	

3. *Bacteria not detectable*

commercially sterile

Points 1·1 and 1·2 need no comments. It is obvious that the content is unfit for human consumption. Point 1·3 and point 2·3 may be difficult to interpret if spoilage is not detectable. Some types of canned fish normally harbour many dead bacteria. In tomato products high numbers of *Lactobacteriaceæ* will often be present, originating from the tomato purée, while in most other fish products bacteria are seldom present microscopically if they are not cultivable.

It is difficult to establish standards in this respect. A tentative standard might be that there should not be more than 10^5-10^6 bacterial cells present microscopically per ml. of content.

Such a standard could not be used rigidly. It has been argued that the presence of dead bacteria is of no hygienic importance. Although it is true that botulinum toxin is destroyed by commercial heat processes, the case may be one of autosterilisation where the toxin has not been subjected to any heat treatment at all. Further, there is evidence that staphylococcus entero-toxin is not always destroyed during commercial processes. (Such a case was investigated in Denmark involving a 3-oz. can liquid pack of shrimp.)

Points 2·1 and 2·2 require closer examination. It has to be checked that no air contamination of the media has taken place. If this is not the case, and if it is established by prolonged incubation that the bacteria multiply in the product, it must be regarded as a case of underprocessing or leakage, depending on the types of bacteria present and the results of seam examination.

On point 2·3 the contents of the can must be regarded as commercially sterile. The result does not mean very much in terms of absolute sterility. In order to check the sterility of a can it would be necessary to inoculate the whole contents of the can in good germination media and incubate them very long. Very few spores (*i.e.* 10 per can) can give rise to spoilage, but there is little chance of finding 10 spores in a 1 kg. can, especially if the contents are fluid, by inoculating even 10-20 g. This is of no practical importance, because it is the commercial and not the absolute sterility which is important. Therefore incubation of the cans is the best bacteriological sterility test which can be performed with most canned fish products. Bacteriological examinations of sterility without pre-incubation or storage of the cans before examination is not of much use.

Are samples of normal quality?

It is usually possible to reach quite clear-cut results about the examined, incubated cans. The conclusions which can be drawn with regard to the lots from which the cans are drawn are, however, usually meagre, since the examination of a few cans does not justify far-reaching conclusions regarding the whole batch in question. The following figures[23] show what percentage of spoiling cans may be present and undetected ($p=0.05$) by incubating and examining different numbers of cans.

Number of cans examined	*Percentage of spoiling cans not detected*
5	52
10	31
20	17
50	7
100	3·5
200	1·8
500	0·7
1000	0·4

This means that one has to examine about 300 cans in order to be sure of ($p=0.05$) detecting a spoilage level of 1%. If one considers that only about 50% of the non-stable cans may spoil during 14 days incubation at 37°C., many more cans should be examined, to certify that at least 90% of the cans in a given lot were commercially sterile. Such procedures are not practicable.

It must be concluded that not too much confidence should be placed in testing sampled cans. Incubation tests are, on the other hand, not without value because they will show pronounced cases of bad keeping quality. It might, however, be better to store the whole lot of cans at least 6 weeks at room temperature before examining and shipping them. This would allow at least all leakers to show up. This is, however, sometimes difficult for economic reasons.

Control of raw materials, seams and processing values

It is clear from the foregoing that the control of the finished product is not as efficient as desirable. It would be far better to place the control at an earlier stage of production which would also prevent losses.

Control of raw materials leading to bacteriological standards for such ingredients as sugar and starch has been established in several countries (for methods, see Baumgartner[1] and Tanner[9]).

The control of the seaming operation must be performed in the factories, and every effort should be made to educate the personnel in this respect. Many can manufacturers have established a very valuable consulting service with regard to seaming operations.

Calculated heat processes for canned fish products give a much greater insurance against underprocessing than examination of a few cans out of a lot, and are becoming more and more common since Lang's[22] investigations in California. Calculated processes for canned fish in Denmark were established on the basis of killing 500,000 spores of the most resistant anærobes isolated from canned fish. This equals F = 7 min.[24, 6, 25] In the Danish experiments the thermal death time curves did not deviate much from straight lines and the z values were around 18°F. (11·7-18·9). The choice of F = 7 min. agrees well with the results, Lang obtained by using very high numbers of *Cl. botulinum* spores and calculating from food/phosphate factors. As a minimum value (high degree of safety against *Cl. botulinum*) we chose F = 4·5 following the arguments of Gillespy.[26] An F-value of this size has been shown to be effective in killing enormously high numbers of spores of the most resistant strains of *Cl. botulinum*.[27] By organoleptic tests it was found that the quality of most products was not appreciably lowered using an F-value of 7 instead of 4·5. Generally the best quality of solid products was obtained by using lower temperature and longer time, and for fluid products by using a higher temperature and shorter time. Calculated commercial processes have been worked out in several countries. In the state of California the calculated heat processes are enforced by law. Much more important than enforcing calculated processes is to give the personnel who operate the retorts a good understanding of what temperature and time mean with regard to heat penetration, spore killing, and multiplication of bacteria. Also in this respect calculated processes are of great value because they are good education examples. The following examples of lack of understanding of the principles governing heat processing can be quoted.

In a canning factory mackerel were steamed before packing in the cans. At the end of a working day it was not possible to get the last lot of steamed mackerel packed and retorted the same day, and the fish was therefore kept in the slow cooling steam cabinet overnight. The result was that a very high percentage of the cans later swelled because of under processing. A close examination showed that spore formers had multiplied and sporulated in the steamed mackerel because they had been kept at too high a temperature overnight.

In another factory where shrimp were canned, the cooked, peeled shrimp was kept in a refrigerator at 0°C. overnight. Most of the cans later blew because of underprocessing. The reason was that keeping the shrimp overnight in the refrigerator lowered the initial temperature of the cans at retorting to such an extent that the spore killing effect of the ordinarily efficient heat process was reduced to a catastrophic degree.

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▶Croda, Ltd., have published a *Product Users Digest*—a monthly booklet containing notes on the uses of Croda products in all fields of industry. The first issue contains information on the use of polyglycol stearate in instant pudding mixes, polyglycol laurate in poultry food and sorbitan esters in emulsified oils.

▶Industrial applications of nylon from fishing nets to filter cloths are described in British Nylon Spinners' new 20-page illustrated booklet *Nylon Goes To Work*. It claims that many beet sugar factories now spend on nylon only half as much as they used to spend on cotton. On the first carbonation presses, for example, a 15-oz. cotton cloth averages about 30 days; an 18-oz. staple nylon cloth costs four times as much but is said to frequently last two campaigns—a total of 220 to 230 days.

Vinegar Manufacturers Hold Their First International Conference

By John White,* D.Sc., F.R.I.C.

A unique event in the history of the vinegar industry was the holding of the first international congress on this subject in Holland. The event underlined the technical and economic importance of vinegar and gave delegates an international forum to discuss the scientific, legal and economic aspects of their product. On the economic front, there was unanimous hostility to unfair competition from dilute acetic acid masquerading as vinegar. The author of this report attended the Congress and provided the British contribution to the scientific session.

VINEGAR manufacturers in the whole of Europe are grateful to CONAF (the Dutch Association of Vinegar Brewers) for its initiative in organising the First International Vinegar Congress which was held in Scheveningen, The Hague, on May 13-15 last. The Congress aroused much enthusiasm, particularly on the Continent, and delegates attended from Germany, Austria, Belgium, Denmark, Spain, France, Great Britain, Greece, Italy, Luxemburg, Norway, the Netherlands, Sweden, Switzerland and Jugoslavia.

The organisers, and particularly the secretary of CONAF, Mr. A. R. Bueno and his staff, must be congratulated upon arranging a conference conceived on the most ambitious scale, in which perfection was both the aim and the achievement.

Language difficulties were overcome by CONAF in having all proceedings printed in three languages (French, German and English), and by using the Simultaneous Interpretation System employing these languages during the working sessions.

The object of the Congress was discussion of the scientific, legal and economic aspects of vinegar manufacture in all the countries represented.

The meeting place of the Congress was the splendid Festival Hall of the Kurhaus at Scheveningen.

The Delegates were welcomed on Monday, May 13 by the President of the Congress, M. J. K. L. M. Clement, and a hearty welcome to The Hague was extended by M. J. van Aartsen Échevin (Minister for Economic Affairs, The Hague).

The Netherlands Minister of Agriculture was represented by M. V. G. M. Marijnen, who welcomed the initiative of CONAF in convening the Congress on Dutch territory, and stressed the importance of economic co-operation, with particular reference to the forthcoming Common European Market. The considerable economic and social importance of the vinegar industry was emphasised by Dr. M. van Eekelen (Director of the Central Institute for Nutritional Research, Utrecht), when discussing the enormous tonnages of foods preserved by vinegar—in the Netherlands alone 15,000 tons of vegetables were preserved in this way every year.

Scientific papers

The scientific business of the Congress followed the Inaugural Session. The papers mentioned here had been presented to the Congress as pre-prints, and each lecturer was asked to speak about the salient features of his paper, which was then the subject of open discussion.

From Germany Dr. F. Martens (*H. Frings, Bonn-on-Rhine*) showed photographs of the development of vinegar bacteria grown in submerged culture and discussed "Vinegar, the Unknown Substance." This paper stressed how very little is yet known about the relationship between vinegar flavour and odour and known chemical composition. Much work also remained to be done on the physiology and biochemistry of the bacteria employed in vinegar making.

From the Netherlands Dr. W. Verhoeven (*Scientific Research Commission*, CONAF) discussed "Identification and Isolation of Vinegar Bacteria," stressing the considerable complexity of this problem and the unreliability of the older bacteriological work. The speaker discussed the importance of the work of Frateur and his school, and suggested that much more systematic study was essential before our knowledge of the *Acetobacter* could be regarded as reasonably complete.

The Belgian speaker, Prof. J. M. Wiame (*Research Service of the Food Industries Educational and Research Centre, Brussels*), then spoke upon "Study of an Organism of the Acetobacter Group Present in an Industrial Acetification of the High-speed Type." The organism, provisionally named *Acetobacter acidophilum*, was isolated from an industrial mash by employing a medium solidified by means of silica gel and containing 3% of acetic acid and 4% of ethanol. This organism was remarkable in that growth was prevented by *p*H values above 4·5.

Austrian work was discussed by Prof. Otto Hromatka (*University of Vienna*) and by Dr. H. Ebner (*H. Frings, Bonn-on-Rhine*), who described this joint work in the field of submerged fermentation. Prof. Hromatka spoke on "Methods for Investigation of Submerged Vinegar Fermentation," and showed, among many

* Fardon's Vinegar Co., Ltd., Birmingham.

other interesting conclusions, how small quantities of carbon dioxide are essential for the growth of *Acetobacter*. Dr. Ebner discussed development of the method of submerged culture of *Acetobacter* in an interesting paper entitled "Technical Experiences with the Acetator."

M. Jacques Bourgeois of Switzerland (*Bourgeois Frères and Cie, S.A. Ballaigues*) was concerned with "Chromatographic and Microbiological Determination of the Amino Acids of Various Vinegars." He showed that twelve amino acids had been identified in alcohol (in very small traces only). Wine vinegar and lactoserum vinegar were shown to contain quite large quantities of (the same) thirteen amino acids.

The British contribution was by the writer. It was entitled "Problems and Perspectives in the Malt Vinegar Brewing Industry in Great Britain." The methods of brewing malt vinegar were briefly described, and many problems were briefly discussed including the influence of raw materials, mashing and brewing methods upon the properties of the final vinegar. It was shown that a fine malt vinegar can only be produced by careful control of materials and of the alcoholic and oxidative fermentations followed by a long period of maturing in contact with wood.

Legal and economic aspects

The morning session on Tuesday, May 14, was devoted to a survey of the legal and economic aspects of the vinegar industries of the European countries and a discussion of reports presented by speakers as shown below:

1. *Germany*.—K. von Essen (*H. Frings, Bonn-on-Rhine*), "The Industrial Vinegar Situation in the German Federal Republic."

2. *Austria*. — Johann Wagner (*Arbeitsgemeinsch. der Gärungsessigerz, Vienna*), "Economic Problems Confronting Fermentation-Vinegar Makers in Austria."

3. *Belgium*.—G. Dothey (*Vinaigrerie l'Etoile, Woluwe, Brussels*), "The Economic Situation of the Vinegar Brewing Industry in Belgium."

4. *Belgium*. — *Ibid*., "The Legal Situation of the Vinegar Brewing Industry in Belgium."

5. *Spain*.—Juan Carcélen Herrero (*Juan Carcélen Herrero, Murcia*), "The Vinegar Situation in Spain."

6. *France*. — Maurice Bernard (*Bernard Fils and Cie, Dijon*), "Introductory Report."

7. *France*.—R. Martinet (*Secrétaire-Général du Synd. Nat. des Fabricants de Vinaigres, Paris 2e*), "Report of Vinegar Legislation and Control in France."

8. *Greece*. — Démétre Papadimitriou (*Amvrossia, Athens*), "The Economic Vinegar Situation in Greece."

9. *Italy*. — Dr. Fulvio Rossi (*Sindacato Italiano Aceti, Milan*), "Introductory Report."

10. *Norway*.—Eystein Magnus (*Norex a/s Eddikbryggeri, Drammen*), "Report on the Vinegar and Chemical Vinegar Industries in Norway."

11. *The Netherlands*. — R. Schönhuth (*Haas' Azijnfabr. N.V. Haarlem*), "The Situation in the Dutch Vinegar Industry."

12. *Sweden*. — D. Thomson (*A/B P. Hakansson, Eslöv*), "The Swedish Vinegar Industry of Yesterday and To-day."

13. *Switzerland*. — Charles Bourgeois (*Bourgeois Frères and Cie S.A. Ballaigues*), "Vinegar Legislation and Control in Switzerland."

14. *Jugoslavia*. — Prof. Dr. Fiser Ferdo (*Landw. forst, fakultet, University of Zagreb*), "Development and Present Situation of the Vinegar Industry in Jugoslavia."

No official report had been sent from Great Britain, but copies of

"The Legal History of Vinegar," by R. A. Robinson, published by the Vinegar Brewers' Federation of Great Britain, were circulated. The salient points regarding the British legal position were succinctly summarised by Col. B. J. F. Malcolmson.

These reports emphasised the enormous variation in legal standards and requirements in the various countries. Great emphasis was laid by the German speaker Herr K. von Essen upon the difficulties of the fermentation vinegar trade in his country where "by vinegar pure and simple is meant both fermentation vinegar and the products obtained by diluting 'vinegar essence' (*i.e.* chemically produced acetic acid) with water."

The very different situation in France was emphasised by both M. Bernard and M. Martinet, where use of acetic acid of chemical origin in vinegar-making or foodstuffs generally is entirely prohibited. Use of the name "vinegar" for chemically prepared (*i.e.* non-biological) acetic acid is also prohibited in Belgium, Great Britain, Spain and Italy.

In contrast, in the following countries in addition to Germany (see above), the word "vinegar" may be applied to dilute solutions of non-biologically prepared acetic acid; the Netherlands, Norway, Sweden, Switzerland, Jugoslavia, Greece and Austria, although in the latter country such dilutions *must* be labelled "essence vinegar."

In listening to the discussion of these various national reports it was quite obvious that the use of the term "vinegar" for diluted "chemical" acetic acid was regarded by delegates as the biggest menace to their livelihood. Possibility of economic advance of the firms making fermentation acetic acid if the food laws of the various countries could be amended to prohibit "chemical" vinegar was naturally a topic dear to the hearts of these delegates!

Much time was then spent in discussing the difficulties of defining "vinegar" for the proposed European Common Market. Other difficulties in the way of a common legal definition of the term "vinegar" were raised by such matters as acetic acid strength, alcohol content, presence of artificial colours and preservatives and other items.

International co-operation

The afternoon session of the Congress on Tuesday, May 14, was devoted to a discussion of international co-operation.

Finally, resolutions were carried to the effect that CONAF should investigate the possibility of setting up permanent international committees to discuss programmes of (*a*) legal, (*b*) economic and (*c*) scientific co-operation. Each country would be asked to nominate at least one member for each committee which would then propose subjects for discussion at the next Congress.

It was pointed out that financial assistance from the various countries and firms concerned would be required to secure the necessary progress. This was particularly the case in the event of the publication of an International Vinegar Industries' Journal which, it was pointed out, would be a costly project! However, so many of the delegates were keen that it may be the first tangible outcome of this Congress.

The afternoon ended with the delegates passing a hearty vote of thanks to the CONAF for the monumental work involved in organising the Congress.

Social functions

A banquet was held in the Kurhaus at 8.15 p.m. following a reception at 6 p.m. in the Old Town Hall, Groenmarkt, The Hague, by the Burgomaster and Council. Speeches expressing the thanks and appreciation of all the visiting delegates to the CONAF were made by spokesmen of the German, French, Italian and British contingents; British thanks were tendered by Mr. D. MacKenzie.

A remarkable programme was arranged for the wives of delegates by the "Hostesses of The Hague." This association is a permanent committee created for the purpose of voluntarily entertaining foreign ladies staying at The Hague. Wives of Congress members were treated to an amazing display of hospitality, and saw much of The Hague, Delft and surrounding areas accompanied by their charming hostesses, most of whom were trilingual in addition to their other qualifications! Such an organisation must be unique.

Visit to Amsterdam

To allow delegates to meet each other socially and to circulate freely, the last day of the Congress consisted of a visit to Amsterdam, including brief excursions to the fascinating Flower Auction at Aalsmeer, and the wonderful displays of tulips and other flowers at the Keukenhof.

To the Editor . . .

CO_2 Stunning

SIR,

AN error occurs in Table 1 of the article "The CO_2 Method of Stunning Pigs for Slaughter" by our colleague S. M. Blomquist (FOOD MANUFACTURE, May, p. 230). We regret that the wrong figures stem from our manuscript.

In Table 1 columns 2 and 3 should read:

Number of germs/cm²	
Meat side.	*Skin side.*
$9{\cdot}32 \times 10^4$	$4{\cdot}4 \times 10^5$
20×10^4	$4{\cdot}4 \times 10^5$
13×10^4	21×10^5

MOG. KONDRUP,
Operations Engineer.

Danish Meat Research Institute, Roskilde.

An address on *Quality in Sausage Production* by Dr. Charles F. Niven, of the American Meat Institute Foundation, has been published as a booklet by the Foundation. Dr. Niven advocates the use of strict control measures, especially with regard to temperature. Bacteria, he says, play no role in the manufacture of sausages with the exception of the so-called fermented sausages.

Advances in Food Technology

RADISHES

Antibiotic Treatment

Immersion of radishes in a solution of oxytetracycline provides 50% effective immunisation against the disease radish pit, according to a worker at the University of Florida. The symptoms of the disease, which are a serious problem in radish culture, are absorption of water during the 24 hr. after harvesting, followed by lesions after 3 to 5 days.—R. S. Cox, *Chimie et Industrie*, 1957, **77**, 2, 379.

COCOA

Fermentation Experiments

A series of experiments on cocoa fermentation, using heaps, boxes and steel vessels has been carried out in West Africa. Different methods of fermentation were investigated and scientific data relating to temperature, *p*H and moisture changes collected.

The conclusions were that successful 6-day fermentations can be carried out in a box 3 ft. square × 2 ft. deep, using charges of from 200 to 700 lb. of wet beans and turning after two days and four days. Fermentations by the heap method can yield well-fermented cocoa, provided that sufficient care is exercised. The box method, however, can be more closely and simply defined, and in new areas its introduction is to be preferred. A small fermentation vessel, designed to ferment the beans from 150 to 500 pods, has been tested and found satisfactory.

Beans from pods which have been harvested a week before breaking can be fermented without modification of the "standard" box method. Beans from unripe pods can also be fermented without modification of the method. Transportation of wet beans and delays of up to 24 hr. before the beginning of fermentation produced no adverse effects on the fermented beans—as judged by appearance and chocolate flavour.

Scientific data relating to *p*H changes in pulp and cotyledon, and moisture content of cotyledon, during fermentation and drying and the temperatures of fermenting masses have been collected and will prove of value in eventually giving an explanation of cocoa fermentation.

The recovery of Amazonian beans is significantly less than that of Amelonado.—G. R. Howat, B. D. Powell and G. A. R. Wood, *J. Sci. Food and Agric.*, 1957, **8** (2), 65.

MEAT PRODUCTS

Vacuum Packaging

Modern vacuum packaging can improve the appearance of meat products considerably. But the development of micro-organisms is only slightly impeded by the removal of oxygen, and even this effect is obtained only within a certain temperature range as most of those micro-organisms which play an important part in the prepackaging of meat products are potentially anærobic. In many cases, meat products in vacuum packages have a very moist surface so that conditions for the development of micro-organisms are favourable. It is difficult to judge the freshness of vacuum-packaged meat products as there is hardly any noticeable change in colour or dryness, and the smell of the packaged product cannot be tested. It is highly desirable to label meat products in vacuum packages with the warning that they must be kept in cold storage. The packaging can only be regarded as a hygienic measure and not as a preservative.—L. Leistner, *Die Fleischwirtschaft*, 1957, **9**, 262.

FISH

Fermented Fish Sauce

Edible liquid ferments of fishery products are very popular in parts of south-east Asia. Similar products based on meat, *e.g. Maggi* sauce, are used in some European countries. Analyses of *nam-pla* from Thailand have shown this to be essentially a protein hydrolysate. A similar product was prepared on a laboratory scale by the Central Marine Fisheries Research Station, Mandapam Camp, India, to work out a procedure for manufacturing fish sauce on a cottage industry scale. Local sardines were washed in tap water and 100 lb. mixed with 35 lb. salt, placed in a wooden barrel and covered with a further 50 lb. of the washed fish mixed with salt in the proportion 2 : 1. The surface of the piled fish was covered with a thin layer of salt and covered with a wooden lid. After three days the fluid at the bottom of the barrel was drained and returned to the top. Heavy stones were placed on the wooden cover. The barrel was tapped monthly and the resultant liquid was examined for total, formol and volatile nitrogen contents; the chloride content and acidity of the samples and their bacterial count were also determined.

The total, formol and volatile nitrogen contents of the product increased progressively during a five-month period. By this time the volatile nitrogen content of the liquid was nearly one-third of the formol nitrogen; a further increase of this proportion resulted in deterioration of quality. The liquid collected was therefore drained off after five months.

About 50 lb. of a clear, amber-coloured liquid, having no fishy or unpleasant odour, were obtained. It kept well at room temperature for several months.—N. K. Velankar, *J. Sci. Industr. Res.* (India), 1957, **16A**, 3, 141.

FOOD ANALYSIS

Determination of Pb and Cu

A dry-ashing method has been found suitable for the preliminary destruction of the organic matter of a wide range of food materials before the colorimetric determination of trace amounts of lead and copper. The sample is sulphated, which permits ashing to be carried out up to 550°C. without loss of lead by volatilisation. An aqueous suspension of light magnesium carbonate is used as an ashing aid when the amount of ash is small, being added to the sulphated sample after it has been charred and crushed to a powder. After solution of the ash, lead and copper are determined by measurement of the colours of the complexes formed in chloroform solution with diphenylthiocarbazone and diethyl ammonium diethyldithiocarbamate, respectively.—D. Abson and A. G. Lipscomb, *Analyst*, 1957, **82**, 972, 152.

DOUGH

Radioactive Study of Mixing

The use of iodine-131 to study the rate of dispersion of fat in a dough mixing process has demonstrated the ease with which radioactive tracer techniques can be used for studies of this nature.

The use of iodine-131 in this way was suggested by the ready absorption and retention of iodine by the unsaturated linkages of fats and by the convenient radioactive properties of this radionuclide. Besides fat, doughs contain principally flour, water and sugar and sometimes smaller quantities of yeast and salt. The principle of the method was to add the labelled fat to the other ingredients in a dough-mixing machine. Groups of small samples were taken during mixing, and the iodine-131 content of each sample assayed as a measure of its fat content. Equal iodine-131 contents of the samples in a group (within the limits of experimental error) was taken to indicate complete mixing.

Two radio-assay techniques were tested: (1) the sample was suspended in alcoholic lithium hydroxide and counted in a 10 ml. liquid-sample Geiger-Muller tube which was sensitive to about 0·3% of the iodine-131 disintegrations; (2) a small sample disc of the dough mounted below a thin end-window G-M tube was counted directly. The second method proved the more convenient and was sensitive to about 10% of the iodine-131 disintegrations.

The work showed the usefulness of isotopic tracer techniques in the study of mixing processes, particularly where the system is such as to preclude the easy use of conventional analytical techniques, and the speed with which such experiments can be completed is clearly a great advantage.

It would appear that for the sample size and dough mixer employed, the fat was uniformly dispersed after some 2 min. of mixing and further that the mixer was more efficient when fully loaded. These preliminary experiments are to be extended by studying these and other factors involved in the mixing of flour doughs.—D. W. E. Axford, J. B. M. Coppock *et al.*, *J. Sci. Food Agric.*, 1957, **8** (4), 234.

MILK

Reducing Groups of Instant Powders

Although precise details of the processes used in the manufacture of "instant," or readily dispersible, milk powders are difficult to ascertain, it has been indicated that the conditions under which milk is concentrated and dried are frequently such as to favour the initial reaction between lactose and milk protein. The conditions during "instantising" procedures —high relative humidities and elevated temperatures—are particularly favourable to this Maillard reaction. Determinations of ferricyanide reducing groups—an index of the initial stages of the sugar-protein reaction were therefore undertaken.

In general the ferricyanide-reducing values of "instantised" powders were found to be considerably higher than those of normal samples, indicating that the process does indeed favour the "browning reaction." It should be kept in mind that these powders sent from the U.S.A. were two to three months old at the time of examination, but the normal powders were only a few weeks old. The values obtained for two "instant" powders were much lower than those of the others, although still higher than normal low-heat powders. The good dispersibility of these two powders, together with a low reducing capacity, shows that some of the processes applied are capable of producing "instant" powders with less influence on the progress of the "browning reaction."

The Maillard reaction gives end products objectionable in flavour, of reduced biological value, and brown in colour, and is in fact the major form of deterioration in skim milk powder. Any initiation of this reaction must therefore be regarded as in itself undesirable, since it must at least lead to a reduction in the storage life of the powder. No significant difference has been indicated between the vitamin content and biological value of normal low heat non-fat powder and a sample of "instant" powder, although some loss of lysine has been found to occur during the spray drying of milk.

That the conditions of treatment are obviously more severe in some "instantising" processes is demonstrated by the different reducing values of the "instant" powders. It seems important, therefore, that the advantages of "instant" powders be considered in the light of this apparently inherent, if variable, defect—the promotion of the Maillard reaction.—K. Kumetat, R. Beeby and A. K. Morris, *Austral. Jnl. Dairy Research*, 1956, **11**, 3, 113.

▶The 1957 issue of *Bisol Organic Chemicals* has been published by British Industrial Solvents. It provides up-to-date information upon their range of solvents and plasticisers in the form of separate monographs on each product. A series of appendices provide general information on the chemicals.

Machinery and Equipment

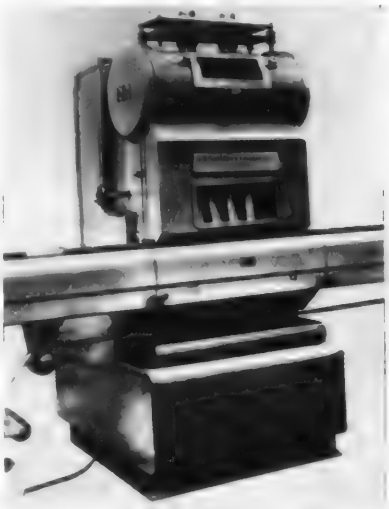
POWDER FILLING

J. G. Jackson and Crockatt have designed a new *Multiple* filling machine with a view to speeding up the handling of free flowing powders and granular materials. This machine will fill cartons, cans, bottles, etc., at a speed of from 100 to 120 per min. A variable speed control has been included to ensure that the filling operation keeps pace with other plant working in unison. There is also an automatic trip device which prevents the discharge of the material in the event of a delay in the supply of containers arriving at the filling machine.

An outstanding advantage is that the amounts filled can be fractionally increased or decreased while the machine is running.

To prevent possible contamination all parts of the machine coming into contact with the product are made of stainless steel.

The *Multiple* is fitted with automatic conveyor feed and can be linked with box-making to make the process fully automatic.



Jackson and Crockatt's machine for filling powders and granulated material.

UNKINKABLE FIRE HOSE

A new fire-fighting hose reel unit incorporates a device which enables the unkinkable hose to be run out in any direction without the obstruction of swinging joints. It has been introduced by The Pyrene Co., Ltd., and is said to be particularly suitable for outbreaks involving combustible materials where a cooling or wetting action is required.

The reel, complete with hose, is mounted on a bearing which is fixed to a wall bracket. The water supply passes through the back centre of the reel and through the hose which terminates in a shut-off nozzle cock. To use the reel, the operator simply opens the water valve while taking the nozzle from its bracket, draws off from the reel enough hose to enable him to get within effective striking distance of the fire, and then opens the nozzle. Immediately the fire has been extinguished, the water can be turned off at the nozzle to prevent unnecessary water damage.

ULTRASONIC CLEANING

One of the main obstacles to the industrial application of ultrasonic cleaning has been the need to make special equipment for specific uses. The introduction of the new Type 413 ultrasonic cleaning generator (made by Dawe Instruments, Ltd) is claimed to overcome this difficulty by providing a flexible unit adaptable to a wide range of requirements.

The equipment consists of a self-contained generator, connected by cable to a transducer by which the electrical impulses are converted into mechanical vibration.

One generator, drawing only about 250 watts of electric power from the mains, can drive one standard 1 gal. ultrasonic cleaning tank or two standard ½ gal. tanks with built-in transducers. Standard immersible transducers are also available to convert existing tanks into ultrasonic cleaning installations with minimum expenditure. Measuring 2½ in. × 8 in. × 3 in. high, two such transducers can be driven by a single Type 413 generator. By combining a number of generators and transducers, an installation of any desired power can be achieved.

Cleaning is carried out by immersing the components in the solvent normally used for manual cleaning. By using special tanks, acids can also be employed for this purpose.

It is impossible to generalise about cleaning times, since these depend on such variable factors as the solubility, toughness and amount of soil to be removed, but processing is said to be much shorter than by hand or by boiling. Ordinary dirt due to handling can often be removed in a matter of seconds in a normal detergent, while even grease rubbed into the teeth of a smooth file is completely removed in about 20 seconds.

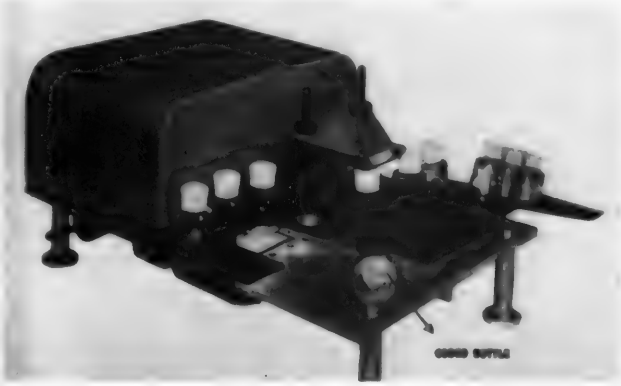
The transducers can be operated in baths kept at temperatures of up to 170°F., which greatly expedites the cleaning action.

CODING MACHINE

Their first motorised coding machine has been produced by Mark-O-Print, Ltd., for coding either the tops or bottoms of small tins, jars, bottles, etc. The bottom of the containers can be slightly curved or recessed.

The machine is claimed to have an output of approximately 90 prints per min. It uses the *Easi-Lock* rubber type system and special fast drying inks. It handles articles which it takes off a conveyor, indexes them correctly, prints them and puts them back on to the customer's conveyor, up to 2 in. dia., 2 in. square or rectangular shapes of 3 in. × 1½ in.

As distinct from other *Mark-O-Print* models this machine does not rely on a friction drive, but has a positive indexing feeding and print unit.



Motorised coding machine for small containers.

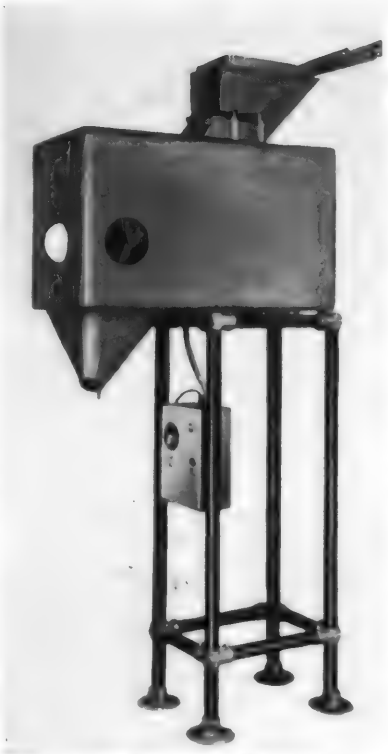
POTATO WEIGHING

A machine which will weigh accurately potatoes, and certain other vegetables, over a range of 2-8 lb. has been produced by Autopack, Ltd. Accuracy is assisted by a grading unit incorporated in the machine. The machine works on similar principles to the *Autopack* vibrator feed weighing machine, in which accuracy is said to be guaranteed by the patented feeding system, which reduces to a minimum the amount of material in suspension.

Weighing machine and grading unit are mounted on a tubular stand. The complete unit has been designed for heavy use, is waterproof, and feed-trays and other parts, which will unavoidably collect dirt, are instantly detachable for cleaning.

The bags do not require to be clipped on to the weighbeam resulting in worn knife edges and irregular weighings, but are placed over the filling nozzle whilst the weighing is taking place. Once set in motion the machine continues to discharge accurately weighed quantities at the preset speed, thus acting as a pace-maker for the operator. Alternatively, the machine can be very readily coupled to the *Autopack* polythene bag feeding machine to discharge the weighings into bags fed and presented automatically.

On 5 lb. weighings the machine will give 10-12 weighings per minute, and change of weight is said to be easily and quickly effected.



Potato weighing machine.

HORIZONTAL FILTERS

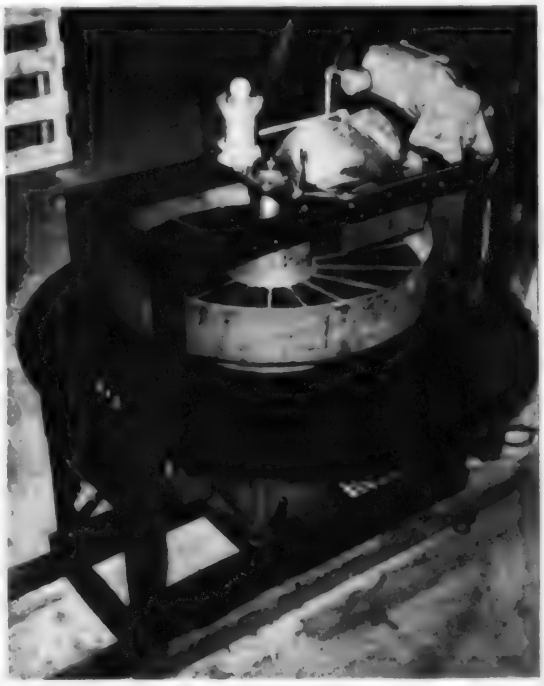
Horizontal rotary vacuum filters known as *FEinc* are being built in Gt. Britain by Stockdale Engineering Co., Ltd., under licence from Filtration Engineers Inc. of U.S.A.

The Stockdale organisation is already well known for the manufacture of rotary drum filters.

One of the main features of a table filter is that it is ideal for easy filtering materials where ample washing is required. They are manufactured in a standard range of sizes from 3 ft. to 12 ft. dia., but special sizes can be made to specification. In addition, modifications can be made to make the filter suitable for any particular application, as the basic design is readily adaptable.

Those sizes from 3 ft. to 8 ft. are fitted with a centrally mounted variable speed drive which is installed in the base of the frame. This is particularly useful in that it eliminates the necessity and cost of separate foundations, and the filter can be moved easily if desired. The larger sizes use a conventional spur gear with roller chain drive which, however, has a ball type main bearing with a replaceable hardened race.

The *FEinc* filter is claimed to have the advantages of high dewatering capacity, large cake capacity and good cake washing which makes it suitable for the continuous filtration of free-settling or free-filtering materials such as coarse crystalline substances and fibrous pulps. All the filtering and washing operations are visible and, therefore, easily controlled. There is a high hourly output per square foot surface, and cake thicknesses up to 4 in., or more can be handled.



Horizontal rotary vacuum filter.

MAGNETO FLOW METER

A new magnetic flow meter introduced by Foxboro-Yoxall, Ltd., is said to offer important advantages over flow meters of the differential pressure and variable area type. It has been developed to meet the need for a fluid flow meter which will measure the volume rate of all fluids with an electrical conductivity, such as many food products.

According to Foxboro-Yoxall, in this flow meter there is no restriction of the flow line, no loss of head and no pressure taps to become blocked, so that fluids of the types mentioned are measured with sustained accuracy. It is simple to instal and its performance is unaffected by surrounding pipework arrangements, variations in density, turbulence, viscosity or suspended materials.

The magnetic flow meter comprises the transmitter and a dynalog flow receiver which may be an indicator, a recorder or a multi-record dynalog. The flow scale is uniformly linear and the meter has a rangeability of 100 to 1. The transmitter itself consists of a stainless steel tube through which the liquid passes, an electrical insulating liner on the inside of the tube, an electro-magnet which induces a magnetic field across the tube and two metallic electrodes which are essentially flush with the inside surface of the tube. Transmitters are now made in line sizes varying from 2 in. to 8 in. (other sizes by request), suitable for flow rates from 0-2,500 g.p.m. to 0-40,000 g.p.m. The measurement of reversing flows is easily obtained and a totaliser may be included, either locally or remotely, to give flow totals in any desired units.

Valve for condenser cooling water.

COOLING WATER VALVE

A water valve, designed to give an adequate supply of condenser cooling water under strictly controlled conditions has recently been marketed by Teddington Refrigeration Controls, Ltd. It is internally balanced so that any change in water pressure will not affect the valve's initial setting.

The upper compartment housing the pressure bellows element and the lower compartment housing the range adjustment spring, are described as effectively isolated from the water flow compartment by reinforced synthetic rubber-nylon diaphragms which have been specially selected because of their good flexibility and resistance to fatigue. The possibility of the ranging mechanism seizing due to corrosion, or the presence of foreign matter in the cooling water, is therefore eliminated as is the danger of loss of refrigerant in the event of a leak in the bellows system.

A length of $\frac{1}{4}$ in. O/D capillary tubing, armoured at its point of exit, is taken from the pressure bellows and ends in a length of $\frac{1}{4}$ in. O/D tubing which is suitable for flaring to make a $\frac{7}{16}$ in. SAE conection. This provides the pressure connection to the condenser, and the capillary acts as a damping device to smooth out any undue pulsations of pressure. Additionally, provision can be made for a connection to be taken from the bellows compartment to a pressure control acting as an alarm or shut-down device to give warning of any rise in pressure in the bellows compartment (normally at atmospheric) due to a refrigerant leak or the unlikely event of fracture of the diaphragm. The valve body is a hot-brass stamping with a $\frac{1}{2}$ in. seat diameter, and $\frac{3}{4}$ in. BSP female connectors into which can be fitted adaptors or unions to suit other pipe sizes. The approach of standardisation on one basic design of valve body means that production and stocking is confined to one model only.

The refrigerant pressure range is 0/160 p.s.i. with a maximum working pressure of 250 p.s.i. which is inclusive of a 90 p.s.i. throttling range. The valve is suitable for water pressures up to a maximum of 150 p.s.i. A fixing bracket can be supplied with fixing hole centres similar to those of the Teddington WV and EF water valves, to facilitate installation of the new type GK valve.

THREE-ELEMENT BOILER-LEVEL CONTROL

A *Three-element* drum water-level control system is now available as an integral part of any automatic-boiler-control scheme produced by George Kent, Ltd., for water-tube boilers.

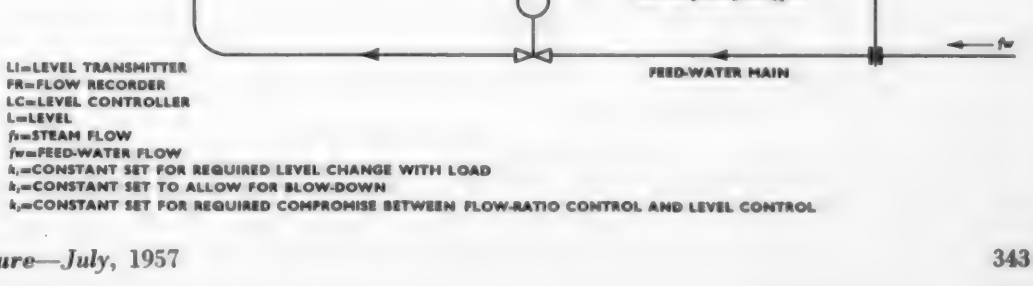
The three elements refer to the three measurements—feed-water flow, steam flow and drum water-level—all of which are essential for the efficient control of the amount of water in the drum, regardless of the most severe plant fluctuations. The system can be readily adjusted on site.

In a modern water-tube boiler, the ratio of water content to heating surface is small, and any excessive variations in the drum water-level may result in serious permanent damage to the plant. Deviations occur either when the steam output of the boiler differs from the input of feed water, or when there is a change in drum pressure. These two conditions are related, so that two opposing control requirements exist. For an increased steam demand it can be seen that it is necessary to: (*a*) increase the feed-water flow to balance the higher steam flow; (*b*) decrease the feed-water flow to correct the instantaneous rise in water-level owing to the fall in drum pressure.

The Kent *Three-element* control scheme combines drum-water-level control with steam-flow/feed-water ratio control. These controls both act by regulation of the flow of feed water, and the extent to which one predominates over the other can be adjusted to any value between pure level control and pure flow-ratio control. The scheme also caters for individual requirements by the inclusion of adjustments to allow for average blow-down and for the amount by which the level tends to alter as the result of a given change in steam demand.

The system makes use of four instruments, a drum-level transmitter, a steam-flow transmitter, a feed-water-flow instrument fitted with a computing and transmitting mechanism, and the master instrument of the scheme, a level controller.

The instruments may also be used simultaneously for other purposes (for example, the steam-flow transmitter may be used as part of a steam/air ratio system).



Three element drum water-level control system.

LI=LEVEL TRANSMITTER
FR=FLOW RECORDER
LC=LEVEL CONTROLLER
L=LEVEL
f_s=STEAM FLOW
f_w=FEED-WATER FLOW
k_1=CONSTANT SET FOR REQUIRED LEVEL CHANGE WITH LOAD
k_2=CONSTANT SET TO ALLOW FOR BLOW-DOWN
k_3=CONSTANT SET FOR REQUIRED COMPROMISE BETWEEN FLOW-RATIO CONTROL AND LEVEL CONTROL

News Digest

"Reasonable" Bread from Damp, Stored Wheat

Experiments on the air-tight storage of damp grain have shown that a loaf of reasonable quality—though with rough texture and a slight off-flavour—can be made from wheat with a moisture content of 19% stored hermetically for up to 9 months, according to the latest report of the Pest Infestation Research Board (*Pest Infestation Research*, 1956, H.M.S.O. 4s. 6d. net). Under ordinary peacetime conditions, however, this would not be acceptable to the millers because of the texture and the slight off-flavour of the finished loaf. The experiments were made to try and preserve, in millable condition, wheat with moisture contents of 20% and over without using artificial drying. This proved impossible, but interesting conclusions on the hermetic storage of damp grain were drawn.

Wheat whose moisture content is 16% or less can be kept for many months in air-tight storage and be used to make a loaf practically no different from normal.

Changes in smell and taste which occur in very damp grain stored hermetically are caused by anaerobic organisms. Although the grain is unsuitable for human use there seems to be no reason why it should not be used for animal feeding.

Hermetic storage of dry grain may be of great value where insect attack is the main danger. Various methods of hermetic storage which might be useful in hot temperate and tropical climates, including an above-ground silo and oxygen-tight plastic films have been, or are being, tested. Africa and India are two countries which might benefit from this method of storage.

Corrosion Convention: advance programme

Advance programme details of the Corrosion Convention reveal that leading authorities will be presenting papers on many aspects of the control and prevention of corrosion. The Convention is being organised by the Leonard Hill journal, *Corrosion Technology*. It will be held on October 15 and 16 next in conjunction with the Corrosion Exhibition which is to run for three days from October 15. The Convention will be held at the Central Hall, Westminster, the Exhibition at the Royal Horticultural Society's Old Hall, Westminster.

Among those who will be giving papers at the Convention are H. Hollis, Deputy Director of Chemical Inspection, Ministry of Supply; J. B. Cotton, Head of Corrosion Research at I.C.I. Metals Division; F. A. Paine and D. Watkinson of Patra; W. Godfrey Waite, Director, F. A. Hughes and Co., Ltd.; Dr. H. B. Footner of Shell Petroleum Co., Ltd.; W. E. Martin of B.X. Plastics, Ltd.; G. H. Jenner of Schori Divison, F. W. Berk and Co., Ltd., and G. G. Sindery of Houseman and Thompson, Ltd.

The subjects which will be discussed at the Convention include paints, metals and alloys, high polymers, water treatment, packaging, cathodic protection, corrosion in the oil and chemical industries, and metallic coatings.

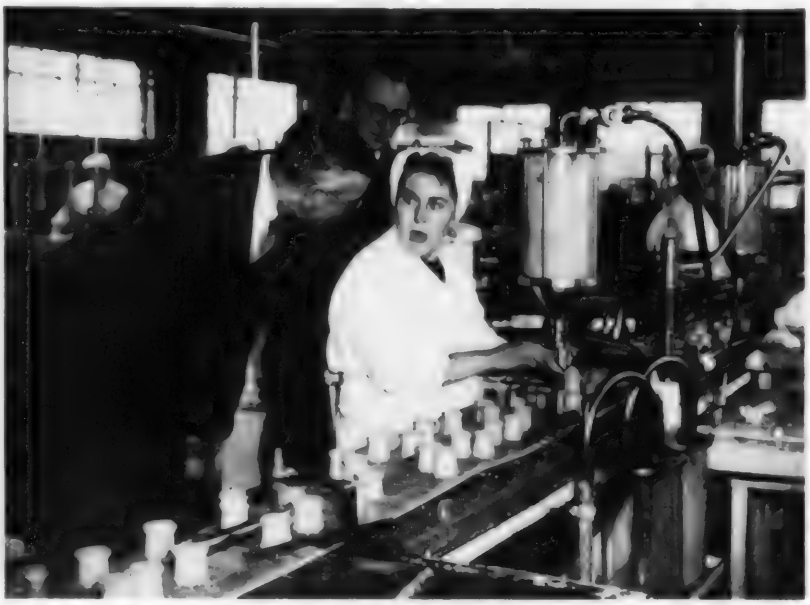
Intending delegates to the Convention are urged to make early application. The fee is two guineas, which includes a set of pre-prints. For an extra two guineas, delegates may also attend the Convention dinner which is being held in London on October 16. Application forms may be obtained from The Organiser, Corrosion Convention, Stratford House, Eden Street, London, N.W.1.

Standards for imported cheese?

Enquiries are to be made by the County Councils Association—which represents county authorities throughout the country—into whether it would be possible to apply in Britain minimum standards of composition for imported cheese laid down by the country of origin. The research was decided upon following consideration by the association's public health committee of the Food Standards Committee's recommendations on processed cheese and cheese spread.

The public health committee had paid special attention to whether there should be minimum standards of composition prescribed by regulation for different varieties of cheese.

Apart from these enquiries, the association is inviting the Food Standards Committee to consider recommending standards for cream cheese. It has also expressed the view that if regulations make it optional for the butterfat content (as a percentage by weight of the article as sold) of processed cheese or cheese spread to be declared, they should also provide that where such option is exercised the moisture content also must be declared.



Mr. Godber's Progress

Vacuum filling techniques at Brand and Co.'s factory are studied by Mr. Joseph Godber, joint Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food, who is continuing his series of visits to food processing factories. Accompanying Mr. Godber is Mr. Colin Dence, managing director of Brand and Co.

NEW CANNERY AT MAIDSTONE

Current progress on Foster Clark's new canning factory at Maidstone. When complete, the new section will cover 50,000 sq. ft. and—it is estimated—will have cost over £150,000.

Bulk handling for Scottish mill

The Scottish Co-operative Wholesale Society, Ltd., has announced a programme of modernisation for their Regent Mill in Glasgow, which specialises in the production of flour for the baking industry. Improvements are also planned for the warehouse with the object of eliminating the existing evening and night work and allowing concentration on day-time packing.

In the modernised mill production should be increased by up to 25%; the labour force will be used more efficiently and economically; maintenance costs should be cut; greater use of automatic controls will provide the advantages which such methods imply; hygienic demands will be fully met.

The main changes will be in the processing sections. New machinery for all the milling processes will utilise pneumatic handling to the fullest extent. Sequence control will be achieved from an installation of five 125 h.p. motors driving the main line shaftings operating the main roller mills. Unit drives will be used extensively for the remaining sections of the plant but in effect the changes will mean a complete modern electrical installation with maximum use of automatic controls. Along with the main provision for bulk flour the changes are designed to meet the problem of evening and night work. The warehouse is to be equipped with bulk storage bins which will allow continuous operation of the mill and continuous feed into the warehouse but with sufficient capacity to permit a night-time build-up against day-time packing.

The operation of 24-hour routines discourages many of the younger men from continuing in the industry so that anything which tends to decrease dependence on night operation should assist in recruitment of the right type of worker; another obvious benefit from the scheme will be a definite reduction in the amount of manhandling required at various stages which in turn will tend to make the work more attractive, but the project is unlikely to be completed until 1959.

Changes of address

Van den Berghs, Ltd., have moved their head office from Bridgwater House, Great Suffolk Street, S.E.1, to Kildare House, Dorset Rise, London, E.C.4. Telephone: FLEet Street 3060.

Their hospital and catering service remains at Monotype House, 43, Fetter Lane, E.C.4, and the Stork Cookery Service is still operating from 38, Queen Street, London, S.E.1.

Glycerine, Ltd., have moved to Conway House, 8, Tudor Street, London, E.C.4. Telephone: Central 7474. Telegrams, Cables: Glymol, Telex, London.

The Semtex office in the West End of London has moved to c/o Alfred Goslett and Co., Ltd., 127, Charing Cross Road, W.C.1. (Telephone: Gerrard 7890).

Fire damages brewery

Two hundred and forty casks of beer, worth £5,000 to the brewers, were destroyed in a fire which badly damaged the upper floor of a three-storey building at the Burton-on-Trent brewery of Truman, Hanbury, and Buxton, Ltd.

Flour mill blaze

Fire destroyed the flour mill of the Riverside Milling Co., at Glasgow—one of the J. Arthur Rank group—in one of the biggest outbreaks in Glasgow for over 25 years. The fire is believed to have started in the bran flat at the top of the 100 ft. high mills handling animal feedstuffs. The first indication of the danger came about 1 a.m. and within an hour the complete rear part of the building was ablaze.

Losses—estimated to be at least £500,000 were aggravated by the fact that the mills were particularly active and fully stocked.

Spillers buy Glasgow bakery

Montgomerie's Bread Co., Ltd., of Ibrox, Glasgow, has been sold by the parent company Montgomerie and Co., Ltd., millers, maltsters and food specialists to United Bakeries, Ltd., the Spillers subsidiary. This transfer eliminates the last major independent bread-making unit in Glasgow, all the larger concerns there being now within one or other of the major national bread manufacturing groups. Montgomerie and Co., Ltd., will continue as formerly independently and will also continue John Campbell, Ltd., their confectionery manufacturing subsidiary in Perth. Mr. Alastair Montgomerie, grandson of the founder, becomes managing director under the new ownership.

£¼ million bakery

Costing £250,000 and claimed to be the most modern in Britain, a new bakery was opened at Taunton recently to supply bread to Co-operative Societies in many parts of Somerset, Dorset and Devon. It was opened by the South-Western Co-operative Bakery, Ltd., a federation of eight Societies in south-west England.

The present plant is capable of turning out 2,000 loaves per hr. and it is expected that a confectionery plant will be added later. Only 36 men, working in shifts, are required to operate the bakery and the preparation of dough for the ovens is controlled by one man at an electric control panel.

Everything is controlled by pre-set electrical devices which determine the heat, humidity and timing of the various processes. Further automatic devices assist the packing of the loaves into aluminium-lined lorries.

North's largest ice-cream depot

A unique ceremony marked the opening of the north of England's largest ice-cream supply depot in Newcastle-upon-Tyne recently for T. Wall and Sons (Ice Cream), Ltd., when Lord Westwood was driven by Wall's group chairman, Mr. Cecil W. Rodd in a 1926 vintage model 'T' sales van, breaking a tape across the entrance.

The new depot, situated at Benton Road, Newcastle-upon-Tyne, replaces premises established in St. Mary's Place in 1932. Wall's 102nd depot, the building covers 10,500 sq. ft. and is capable of storing more than 22,000 gal. of ice-cream, which will be distributed by a fleet of delivery vans to over a million people in Newcastle-upon-Tyne, Durham, Gateshead, Tynemouth, South Shields, Whitley Bay, Wallsend, Blyth, Morpeth, Alnwick and surrounding districts. The depot's cold store is capable of holding sufficient brickettes to supply the entire population of Northumberland, plus the inhabitants of Gateshead.

The depot staff will total 60, with Mr. H. Moorhouse as manager.

Metal Box Co.'s experimental store

The Metal Box Company's new head office at 37, Baker Street, London, is nearing completion. The ground floor frontage on Baker Street is being developed as a modern packaging centre and will be opened on July 5.

The centre will include, in addition to the company's showrooms, two main features—an experimental self-service store and the Canned Foods Advisory Bureau, previously at 17, Wigmore Street. The first of these, the MB Self-Service Store, will be open to the general public for the sale of packaged goods. From this venture the company hopes to obtain useful information on the actual marketing of products in both well-established and newly developed containers.

The MB Self-Service Store is designed as a modern air-conditioned unit with a wide, glass frontage on Baker Street. The floor area will be approximately 3,000 sq. ft.; part of it will be equipped as a pre-packaging room, which will both service the store and be used for demonstration purposes.

Everything on sale will be packaged. The range of stock will include all food items with the exception of fresh meat, and a special section will be devoted to the sale of *Worcester Ware*, the company's decorated kitchen ware and fancy goods.

Metal Box believe that by operating a unit of this type valuable information on the performance of packages at the point of retail sale will be obtained. The knowledge thus obtained will be available to their customers and to the distributive trades.

Erections and Extensions

Kestrel Products, Ltd., are having a fish processing factory built at Tulles, Aberdeen.

■

East Kent Packers, Ltd., are planning extensions to their factory at Whitstable Road, Faversham.

■

The **Highland Distilleries Co., Ltd.**, have had plans prepared for the construction of a warehouse at Dawson Road, Craighall, Glasgow.

■

John Ramsay and Sons, bacon curers, are planning the erection of a factory and slaughterhouse at Mount Stuart Street, Carluke, Lanarkshire.

■

J. Storey and Sons, mineral water manufacturers, have had plans drawn up for a bottling factory in Blandford St., Newcastle-on-Tyne.

■

The Paisley Dean of Guild Court have approved of plans submitted by **Cadbury Brothers, Ltd.**, for the building of a new storage and distribution depot at Potterhill, Paisley, at an estimated cost of £298,000. The new building will be two storeys high and 390 ft. long, and provision will be made for a loading base and office accommodation. It will employ a staff of over 30.

■

Minsterley Creameries, Ltd., have applied for permission to build a trade effluent neutralisation plant at Ministerley, Shropshire. The application has been considered by Atcham Rural Council's planning committee which has decided to recommend to the County Planning Authority that permission to develop should be granted.

■

Lloyd Rakusen and Sons, Ltd., manufacturers of Kosher foods, have purchased 60,000 sq. ft. as an extension to their existing premises which cover 80,000 sq. ft. Increased production is planned to meet a worldwide demand for the 160 foods and household soaps, etc., put out by this firm.

■

Thomas Scott and Sons (Bakers), Ltd., have had plans prepared for the construction of extensions to their bakery at Dunnings Bridge Road, Aintree, Liverpool.

■

Thomsons, aerated water manufacturers, have had plans prepared for the early erection of a mineral water and bottling factory at The Strand, Barrow-in-Furness.

Lautier Fils' reorganisation

The Foodstuffs division manufacturing unit of Lautier Fils, Ltd., has been moved from the company's Power Road factory in London to a new factory at North Feltham, Middlesex. The sales and administrative offices will continue to operate from Power Road.

The move is part of a reorganisation programme, under which a new company Lofil, Ltd., has been formed to market the essences and flavouring materials which Lautier Fils, Ltd., manufacture for the food trades. A further scheme under the programme is the establishment of a depot and bulk manufacturing unit at Steeton near Keighley, Yorkshire, to enable the company to deal with its growing mineral water and squash business in the north.

Lofil's directors are Mr. William A. Robertson, who is in charge of sales and Mr. Reginald T. Burley, who is technical director. (See PEOPLE).

Yale and Towne extend

Extensions covering 27,600 sq. ft. to the Yale and Towne factory at Wednesfield, Staffs. were opened last month. The plant now occupies seven of seventeen acres and its production of hoists, hand lifts and industrial trucks is planned to be doubled before the end of this year.

Following the speeches at the opening ceremony, visitors were conducted on a tour of the new extensions and witnessed a demonstration of the entire range of Yale and Towne's mechanical handling equipment.

Mr. Gilbert Chapman, president of Yale and Towne Manufacturing Company, arrived from U.S.A. to take part in the opening ceremony. He said that industry in both production and distribution was faced with the continuing challenge of high costs and the control of costs was the key to successful competition.

The wider acceptance of mechanical handling machinery was inevitable. It followed from the need to produce more under safe conditions at an increasingly accelerated rate.

Industrial Truck Association

Members of the Industrial Truck Manufacturers' Association have regrouped themselves under the title of the British Industrial Truck Association.

The framework within which the association works consists of five council members under a president, who in the first year of operation, will be Mr. John Morris of Coventry Climax Engines, Ltd. The address of the association and the official secretary is Peat, Marwick, Mitchell and Co., 94-98, Petty France, London, S.W.1. (Telephone: Abbey 7101.)

Private tea trading defended

Commenting on the recent findings of the Monopolies Commission on the tea trade, Mr. R. H. Turton, Conservative M.P. for Thirsk and Malton, Yorks, said recently: "Tea pre-war cost 2s. 8d. per lb. Today the same tea costs 4s. 4d. per lb. I have just come back from Germany where tea costs 15s. a lb. We are lucky."

Mr. Turton continued: "Look at the product of an industry now nationalised—coal. Pre-war coal under private enterprise cost 2s. per cwt. Today it costs about 8s. per cwt. If coal prices had risen no more than tea prices coal could today cost 3s. 3d. per cwt.

"For the old people tea and coal are the two most important items in their weekly budget. They must be very grateful that the tea trade was not nationalised by the Socialists."

Research on pickles and cocoa butter

Two new research reports issued to members of the British Food Manufacturing Industries Research Associations are:

Microbiological Keeping Quality of Pickles and Sauces, by J. C. Dakin, (No. 79); and *Crystallisation and Stability of Cocoa Butter*, by E. H. Steiner (No. 77).

Details of a pasteurising process designed to give an adequate shelf life to low-acid pickle packs, were given in *The Pasteurisation of Pickled Onions—I* (Research Report No. 56) issued by the Associaton to its members in May 1954.

The new report deals with the behaviour of such packs after opening in the home. It records the results of a test in which 20 commercially prepared packs of beetroot were opened in domestic households with some of the contents of each pack being exposed in open dishes and the rest left in the jar.

Previous work to Mr. Steiner's report was concerned mainly with a study of the crystallising behaviour of palm kernel stearin, alone and in mixtures with cocoa butter with the object of finding out the limits of suitability of these fats when used as alternatives to cocoa butter.

Research report No. 77 is concerned only with the crystallisation behaviour of cocoa butter itself and the stability of the various forms of cocoa butter in relation to the production of fat bloom. Divided into four parts, this report also contains a summary of the important experimental results obtained.

Results so far obtained mark an important step forward in the understanding of the behaviour of cocoa butter when it is solidified during the production of chocolate. This, in turn, may lead to a better understanding of the tempering process.

OBITER DICTA

● There should be less sumptuary eating by Ministers.—*Mr. Jo Grimond, M.P.*

● It is noticeable that breweries seem to amalgamate more quickly than water undertakings.—*Lord Mancroft.*

● Stockport magistrates were told that when Mrs. J. Burgess opened a bottle of sterilised milk to feed her baby, one mouse and half another were found inside.—*Daily Telegraph.*

● When I was an ordinary city worker I would pop into the pub down the street for a beer but you can't do that sort of thing when you are Lord Mayor.—*Sir Cullum Welch, Lord Mayor of London.*

● How is it possible that the English, to whom tea is as much of a ritual as it ever was to the Japanese, continue to tolerate that national shame and abomination, the "set tea"?—*The Times.*

● As an old age pensioner I could do with restoration of that ¼ lb. which was filched from the 2 lb. loaf after the war—and has vanished from the memories of the public.—*Letter to Sunday Express.*

● A menace to waist lines and health is the austere definition given by the Physician to Congress for the rich foods offered by hostesses in Washington to politicians. He warns these much dined men that they are in danger of being "beef-steaked" to death.—*The Times.*

● A Soviet writer said that the London Underground was full of advertisements and posters. He described the advertisements which annoyed him: some animal, hanging upside-down, could be seen drinking stout; a black cat gazed into a light-bulb; and a fat monk was drinking rum.—*Manchester Guardian.*

● At a meeting of the Argyll and Bute Executive Council, the chairman of the Medical Committee reported that he had investigated a case where sherry wine had been prescribed by a doctor as a vehicle for the administration of morphine and cocaine. The opinion of the medical committee was that in this case the sherry wine should be regarded as a drug, and be allowed for payment.—*Pharmaceutical Journal.*

NEWS FOR IMPORTERS

Imports of bottled apples and canned apples.—The Board of Trade announce that a further quota has been established for the year ending June 30, 1958, for imports of bottled apples and canned apples originating in and consigned from the "relaxation" countries, (chiefly O.E.E.C. countries and their dependencies). The value of the quota is £600,000 c.i.f. as in previous years.

Further details, including the method of applying for licences, are given in Notice to Importers No. 817 issued by the Import Licensing Branch of the Board of Trade.

Fresh apples.—The Board of Trade and the Ministry of Agriculture, Fisheries and Food announce that the quota for imports of apples from North America (Canada and the United States) for the season 1957-58 will be the same as for the 1956-57 season. Imports will be permitted to a total value of £1,250,000 f.o.b. Licences for imports will not be valid until November 16, 1957, and imports between that date and December 31, 1957, will be limited to a value of £300,000 f.o.b. Further details of the Import licensing arrangements will be announced by the Board of Trade shortly.

Importers are expected to be able to buy some 20,000 to 25,000 tons of apples under the arrangements now announced. Pre-war imports from North America averaged about 200,000 tons a year.

Tax aid for fuel saving plant

The Treasury have made the Investment Allowances (Fuel Economy Plant) Order, 1957.

Section 15 (3) (b), Finance Act, 1956, provides that investment allowances are to be continued for expenditure incurred after February 17, 1956, on prescribed fuel-saving plant if it is installed by way of modification or replacement of plant in use in the U.K. The Investment Allowances (Fuel Economy Plant) Order, 1956, prescribed a list of fuel-saving plant and the conditions, if any, upon which such plant was prescribed. The present Order prescribes, as from the date when it comes into operation, the following additional items of fuel-saving plant, subject to the conditions shown opposite each in the Schedule to the Order:

Para. 2 (a): oil drip feeders.
Para. 4 (c): flash steam vessels, piping, ducts, and fans.
Para. 8 (b): fuel meters.
Para. 9: heat pumps.
Para 10: capacitors.

The Order came into operation on June 5, and has been published as Statutory Instruments 1957, No. 938.

PEOPLE

MR. J. SIM MACGREGOR of Garrion Mills, Wishaw, has been elected president of the Scottish Oatmeal Millers' Association. It will be his second term.

■

MR. FELIX L. LEVY, joint managing director of George Cohen Sons and Co., Ltd., has been elected president of the National Federation of Scrap Iron, Steel and Metal Merchants.

■

MAJOR-GENERAL C. F. PHILLIPS has been elected president of the British Trawlers' Federation, governing body of the fishing industry. He succeeds MR. JACK CROFT BAKER, of Grimsby.

■

MR. J. L. T. MCADAM has been appointed to the board of Fisons Milk Products—a member of the Fisons Group and makers of *Cockade* brand milk powders. Mr. McAdam was until recently chairman of the Northern Ireland Milk Marketing Board.

■

MR. JAMES BYERS, has been appointed president of the Scottish Egg Trade Association succeeding Mr. J. H. CARMICHAEL. The appointment was made at the annual general meeting held in private in Glasgow. The association issued a statement indicating support for the British Egg Marketing Board scheme.

■

MR. WILLIAM GRANT, manager Scottish Co-operative Wholesale Society's flour and allied departments since 1945 is leaving to take up an appointment as flour adviser to the Allied Bakeries group. Mr. Grant has been 35 years with the Scottish Co-operative Wholesale Society, is a past president of the Scottish Oatmeal Millers' Association and president of the Pearl Barley Millers' Association. He is succeeded by E. B. BROWN assistant manager who trained at Chancelot Mills, Leith, and became technical adviser and then assistant manager to Mr. Grant.

■

MR. H. R. FREEMAN has resigned as chairman of Coates and Co. (Plymouth), Ltd., the gin manufacturers and has been succeeded by his son, MR. ROBERT FREEMAN.

Joining as a partner in 1899, Mr. Freeman, senior, has been associated with the firm for 58 years. Aged 78, he was educated at Winchester and has been prominent in many local activities, notably as a former captain of Tavistock Golf Club and chairman of the committee of the Royal Western Yacht Club. He has served on numerous hospital committees.

Mr. Robert Freeman joined the company in 1928. He was also educated at Winchester and served in the R.A.F. during the last war.

MR. REGIONAL T. BURLEY has been appointed technical director of Lofil and is now in charge of all research and development work at the North Feltham factory in connection with the production of fruit and flavouring essences and extracts, concentrated fruit juices, etc. Mr. Burley has had wide experience in all phases of essence production and application.

*

MR. WILLIAM A. ROBERTSON has been appointed director in charge of sales of Lofil, Ltd. He has been with Lautier Fils, Ltd., London, since January 1946 when he was demobilised from the Army after serving in East Africa, Madagascar, Ceylon, India and Burma. His first five years with the firm were spent as export manager and he became sales manager of the flavours division (home trade) in December 1951.

■

The president of the Italian Republic has conferred on MR. GUY CHIPPERFIELD, C.B.E., president of the International Association of Seed Crushers, the honour of Commander of the Order of Merit of the Italian Republic. This information was conveyed by the Italian Minister of Foreign Affairs to MR. A. COSTA, president of the Italian Seed Crushers' Association, who announced it at the International Seed Crushers' Congress recently held at Rapallo, Italy.

*

Obituary

Dr. Leslie Herbert Lampitt, F.R.I.C., M.I.CHEM.E., hon. foreign secretary of the Society of Chemical Industry, hon. treasurer of the International Union of Pure and Applied Chemistry, and director and chief chemist of J. Lyons and Co., Ltd., died on June 3 at the age of 69.

Dr. Lampitt was an active member of the Society of Chemical Industry, which he joined in 1920. He was president from 1946-48; hon. foreign secretary from 1935-36 and from 1948-57; hon. treasurer from 1936-46; Jubilee Memorial lecturer in 1933-34; and chairman of the Food Group from 1931-36. In 1950 he was the first recipient of the Society's International Gold Medal.

He was educated at the old Birmingham Technical School, from which he entered Birmingham University as a Priestley Scholar in 1906. He gained first-class honours in chemistry and biochemistry and in 1911 became chief chemist of La Meunerie Bruxelloise in Brussels. He served in the Army in France during the First World War and in 1919 he joined J. Lyons and Co., to found the company's research laboratory.

He married, in 1915, Edith Potter Potts who survives him with a son.

Radiation presentation symposium

A symposium entitled "Processing of foods with Ionizing Radiations" is to be held at Cambridge on September 26 and 27. Those interested in attending or contributing papers are invited to write to Dr. R. S. Hannan, Low Temperature Research Station, Downing Street, Cambridge for details. Early application is advised as the available accommodation is limited.

An article on the radiation preservation of foods by Dr. Hannan will shortly appear in FOOD MANUFACTURE.

Butter record broken

In an all-out attempt to break the world butter production record of 75 tons in one day, employees at the Wilts United Dairies, Ltd., factory in Chard, Somerset, produced 86 tons recently. Previous record production at this factory—claimed to be the largest butter making factory in the world—was 74 tons in one day. The factory's potential production—possible only during the peak milk season—is 500 tons a week.

Four churns, claimed to be the largest in the world, were used, each capable of producing 2½ tons of butter, approximately every 70 min.

These churns stand 9 ft. 6 in. high; are 9 ft. in depth and are made in New Zealand from a special pine—Kauri—which is particularly hard and odourless (see FOOD MANUFACTURE, May, p. 244).

Analysts' a.g.m.

The annual general meeting of the Association of Public Analysts was held recently. The following officers were elected:

President: F. C. Bullock; *Vice-President:* H. E. Monk; *Hon. Treasurer:* H. E. Monk; *Hon. Secretary:* D. D. Moir; *Asst. Hon. Secretary:* F. A. Lyne; *Hon. Editor:* E. C. Wood.

The retiring president, Mr. E. Voeloker, delivered an address entitled "The Fertilisers and Feeding Stuffs Act, 1926—Its Application and Implication." Comparing the 1926 Act with its forerunners, the Acts of 1893 and 1906, he contended that the measure of protection which the purchaser had enjoyed under the earlier Acts had been largely abrogated. He supported this argument by enumerating the limitations which had been placed upon the powers of sampling and particularly upon the change in the Act which debarred criminal proceedings for false warranty in respect of samples taken after delivery to the purchaser. These limitations and the difficulty in initiating proceedings had seriously impaired the effectiveness of the Act, and a new Act, based on the same principles as the Food and Drugs Act, 1955, was required.

COMPANY PROFITS AND PROSPECTS

Pepper profits up

The price of pepper has now reached a "reasonable" level, according to Mr. Desmond Abel Smith, chairman of the British Pepper and Spice Co., Ltd., who held their annual meeting recently. The company's net profit has risen to £18,562 against £15,755 in 1955. A final dividend of 9% making a total of 13% for the year has been paid.

*

"Ten o'clock tested" sales increase

Additional capital is being issued by Crosse and Blackwell (Holdings), Ltd., and the fresh money will be used to further modernise the company's plant, announced the chairman, Mr. H. L. Roy Matthews at the ordinary general meeting recently.

Total sales of the company's "ten o'clock tested" foods increased substantially both at home and abroad. The trading profit has increased from £1,018,047 to £1,265,962 and the net profit from £454,074 to £543,633. A total dividend of 12½% for the year was paid.

*

Falling fish profits

"Alarming increases in production costs" were mentioned by Mr. W. A. Bennett, chairman of Associated Fisheries, Ltd., in his annual review. "Over the past three years our costs per sea day have risen by 35% with only an increase of 8½% on the average price realised for our product" he said.

Net profits of the company have fallen from £362,475 to £313,345.

Expenditure during the year on modern buildings, plant, etc., for processing, packaging and freezing of fish, fruit and vegetables amounted to £653,113.

*

Chocolate profits soar

A sharp recovery in cocoa and chocolate profits is seen from the accounts of Rowntree and Co., and of Cadbury Bros., Ltd. Rowntree's trading profit rose from £1,053,353 to £2,704,491 and the net profit was £1,219,053, compared with £366,740. The dividend was raised from 12½% to 15%.

The rise in profits was mainly due to stabilisation of cocoa prices and to the absence this year of a heavy stocks write-off. Cadbury again had to write down stock but at a very much lower cost and the value of their home sales increased by 6%. Their net profit for 1956, announced the chairman, Mr. L. J. Cadbury, is £3,679,335 (against £961,023).

Referring to the fall in raw cocoa prices—from £500 a ton to £200 in just over two years—Mr. Cadbury expressed concern on the future of Ghana, of which Cadbury is the largest single customer. "Ghana's economy is largely bound up with cocoa" he said. "It is politically embarrassing for the authorities that the return to cocoa of more normal prices should coincide with the grant of self government . . . the new autonomous state is worried. It may be tempted to try a restrictive policy, but taking the long view this would be disastrous. The true solution, of course, is to stimulate world consumption."

"For the first time since the war ended twelve years ago, staffing the Bournville factory became substantially easier," commented Mr. Cadbury in reviewing the labour requirements of the past year. Cadbury's now employ 11,500 at Bournville, the world's largest cocoa and chocolate factory. Total staff, including subsidiaries at home and overseas, amounts to 25,000. The company has also just completed a new factory in a developing area north of Dublin.

A new selling aid—a self-service dispenser—has been introduced by Trufood, Ltd. for their Spoonfoods *range of strained and homogenised foods for infants.*

The dispenser, which holds 48 jars, is strongly made of enamelled white wire. Transfers on the back point out that the foods are "chemists only" and suggest that the dispenser should only be partially filled since an incomplete display encourages mothers to help themselves. It measures 20 in. high, 12 in. wide and 4 in. deep and is fitted with rubber feet to prevent scratching.

"Easy-to-read" biscuit profits

Shareholders of William Macdonald and Sons (Biscuits), Ltd., received the directors' report and accounts for the year to February 23, 1957 in a new easy-to-read form, illustrated with photographs showing production of *Penguin, YoYo, MunchMallow* and *GlenGarry* biscuits—the four Macdonald products.

Mr. William Macdonald, chairman, informed shareholders that last year's profits reached a record figure, after all charges except taxation, of £438,631, compared with £344,743 for the previous year. Total dividend for the year is 25% on the new capital (increased by a 1 for 2 scrip bonus issue on October 19, 1956).

During the year £229,195 was paid in income tax and profits tax, against £174,483 in 1956. Undistributed profits were £419,120 against £374,717.

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Eventful year for Danish bacon

The outstanding event of the year as far as the Danish Bacon Co., Ltd., was concerned, said the chairman Mr. Frank Herbert, was the termination in September of Government buying and the return to free entry for bacon. After 16 years Denmark once again resumed the role of exporter of bacon to the U.K.

When bulk buying ended prices at first showed a tendency to rise and remained firm at between £300 and £330 a ton, but in the early months of this year these levels declined and it is doubtful whether bacon anywhere during that time was very profitable to producers. However, continued Mr. Herbert, "There has, I am glad to say, been an improvement recently, and as I speak there is lively demand for bacon which suppliers are hard put to it to meet."

Group profits for the year were £417,913 compared with the record last year of £496,154. An interim dividend on the Ordinary shares of 7% was declared in December and a final dividend of 3% has now been paid.

New buildings of standard design have been erected by the company during the year at Cardiff and Rotherham. Top priority is being given to food handling techniques and considerable expenditure has been made on improving hygiene.

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"Welcome to Batchelors"

A 36-page handbook has been published by Batchelors Peas, Ltd., to be distributed to all new employees. It introduces them to their chairman, Col. Batchelor, tells them about the company history and summarises working conditions, company rules and other aspects of employment. It is written in a friendly chatty style and illustrated with thumbnail sketches.

Freeze-drying meat

A paper on "New developments in the Freeze-drying of Meat" was read by Dr. W. R. Smithies at a meeting of the Food Group of the S.C.I. last month. Dr. Smithies, who is head of the Meat division of the Defence Research Medical Laboratories in Toronto, said that freeze-drying meat carried out in conventional equipment is a slow process, the rate of drying being limited by the rate of transfer of heat of sublimation. Rapid freeze-drying can be carried out by laying the meat slices (or other foodstuffs) between heater plates fitted with metal spikes which conduct heat uniformly and efficiently into the material. Layers of material up to 1-in. in thickness can be freeze-dried in 3-5 hr. Raw and cooked dehydrated meats are of great potential value to the military services and will find commercial application.

New luncheon meat

A new pork luncheon meat is now on sale throughout Britain. Known as *Jaka*, it is a Danish product made by Jydske Andelsslagteriers Konservesfabrik. A.m.b.A. from which it gets its name. The new product is being sold in two sizes—7 oz. (retail price 1s. 9d. to 1s. 10d.) and 12 oz. (retail price 2s. 9d. to 2s. 10d.). The makers claim that it is prepared from the meat of specially bred pigs, not from trimmings and oddments and that it does not discolour when removed from the tin.

The makers, whose factory at Braband is said to be the largest and most modern meat canning factory in Scandinavia, also can cocktail sausages, frankfurters and similar products. The factory was built in 1954.

High energy chicken feed

A new farming record—producing 1 lb. of chicken with less than 2 lb. of feed—has been achieved by Maj. G. S. Bowlby of Derbyshire, with a special "high-energy" feed designed by British Cod Liver Oils, Ltd. Getting 1 lb. of chicken with 2 lb. of feed has been regarded as the "four minute mile" of agriculture. It has been achieved in the U.S. under experimental conditions at Illinois University but never before on an ordinary commercial farm.

It is claimed that in large scale trials, the new feed gave a 25% better feed conversion and 9·3% more live weight than the best proprietary feed given to a similar batch of about 2,000 spring chickens. Its production efficiency index was 50% better than that of another well-known proprietary feed.

The high-energy feed was formulated and tested by British Cod Liver Oils at their research station in Hull, where the firm has been carrying out pioneer work on high-energy rations for some years.

Mr. G. E. Tunnicliffe, the general manager commented: "Major Bowlby's record is the culmination of the long series of research and controlled trials based on the theory that fat and cod liver oil pack more 'punch' per lb. than any other feed ingredient."

A spokesman for British Cod Liver Oils said the ration which had given these record results was not a proprietary feed. "It is being made up by several compounders and can be mixed by anyone who wants it."

The formula:

	Parts by weight
White-fish meal (66% protein)	11½
Soya bean meal	7½
Dried yeast	5
Coarse ground wheat	27½
Barley meal	8¾
Ground oats	10
Maize meal	22½
Minerals	2½
* Stabilised cod liver oil high-energy mix	5
Total	100

Plus: antibiotics at 100 gm. per ton for 3 weeks and 25 gm. per ton to slaughter; coccidiostat; and anti-salmonella drug.

* The stabilised high-energy mix consists of 1 part *Super Solvitax* cod liver oil and 3 parts vegetable oil plus antioxidants.

Quaker Oats' dog food

A new concentrated food for dogs, containing 11 major ingredients of meat, stabilised fat and vitamins has been produced by Quaker Oats, Ltd., under the name *Ful-O-Pep*. Sold in 10 oz. packets for 1s. and 20 oz. packets at 1s. 11d., the new product has the appearance of crisp, brown granules. It can be served either dry (total moisture content is under 10%) or with the addition of water, milk or gravy.

The initial campaign for the new product is in the Greater London area in which it is calculated, there are 570,000 dogs.

Cookery centres for Unilever customers

A new Food and Cookery Centre has been opened for Manchester housewives at 33a, Cross Street, Manchester. Sponsored by four Unilever companies —Batchelors Peas, Ltd., Birds Eye Foods, Ltd., Mac Fisheries, Ltd., and T. Wall and Sons, Ltd. The centre will concentrate on demonstration and advisory services, particularly to women's organisations.

In the South of England over 120,000 women have seen demonstrations emanating from the Food Group Kitchen, an organisation of which Birds Eye is a sponsor.

Long service awards at Soflor

Mr. P. W. Crowder was presented with a handsome clock upon his retirement after 25 years of faithful service with Soflor, Ltd., recently. The opening speech at the ceremony was made by the company's secretary, Mr. J. H. Ward and the presentation by Miss D. Norfolk; both having themselves completed 25 years service.

Mr. Crowder, who is now 67, was in charge of the packing department.

Mr. A. R. Carter, another member of the staff, was retiring at the same time, having been with the company for 12 years, but as Mr. Ward said in his opening speech, Mr. Carter had somehow "slid" into Soflor, Ltd., when most men had retired from work. Mr. Carter, who will celebrate his 80th birthday this year, was also presented with a clock.

In addition to the above presentation, both Mr. Crowder and Mr. Carter have been awarded generous pensions by the company.

25 years of Standard Brands

Twenty-five years in the export and domestic manufactured food business have been celebrated by the employees of Standard Brands, Ltd., of Aintree, Liverpool.

Standard Brands began manufacturing *Royal* baking powder in Liverpool on March 1, 1932, although, in fact, this product had been on sale in Britain for nearly 100 years. Since 1932 the annual production has been increased by over fourteen times and the firm's export trade has increased more than a hundredfold.

The company produces a range of grocery products including *Royal* desserts, instant puddings, pie fillings and Chase and Sanborn coffee in vacuum tins. The company was one of the first in the field with instant coffee under the brand name of Chase and Sanborn.

Recipe literature has been published in 24 languages. In East and West Africa the young generation is taught in mission schools how to bake simple cakes with *Royal* baking powder and even in Siam, courses in home-baking have been organised in girls' schools using recipes making use of local ingredients and printed in Siamese.

Of the original 23 employees in 1932, 15 are still with the company. The company's policy of promotion for long service personnel is illustrated by the fact that Mr. A. Yeats has risen from the factory floor to the post of director in charge of production, plant and property and Mr. C. K. Boundy, who began as a chemist became a director in 1946. Mr. R. E. Forrester, who began as assistant chemist, now has charge of coffee purchase and production in both Liverpool and London. Mr. A. Cliffe also worked his way up from the factory and is now in charge of home sales.

Food News Overseas

Record Dominican sugar output

This year's sugar production in the Dominican Republic will exceed a million tons, for the first time. There has been a rise of almost 25% in the country's crop yield in three years—in 1954 the total output was 675,000 tons.

The Central Romana Sugar Co., as part of its modernization schemes, has recently introduced new machines which are expected to raise output substantially this year.

Britain's sugar industry last year imported 410,000 tons of Dominican crude sugar valued at £12 million. After refining much of the sugar was re-exported.

India exporting more sugar

It is reliably reported that India has now contracted to export 140,000 tons of sugar, and that further substantial contracts are in the offing.

These include the possible sale of 15,000-20,000 tons to Pakistan, and 25,000-30,000 tons to China. So far the target is an export total of 200,000 tons. This aim, however, may not be fulfilled. Sugar prices have risen sharply in the domestic market recently, especially since the Finance Minister proposed a sharp increase in the sugar excise duty in the Central Government's Budget. Although the purpose of the duty increase may be to divert sugar from home consumption to export, it is feared that too sharp an increase in exports, leading to a domestic sugar shortage, will be strongly inflationary.

Measures may soon be considered to reduce domestic sugar prices, and the question of restriction of exports will then come up.

Indian fish-freezing vessel

It is reported that the first fish-freezing vessel to operate along the west coast of India has now arrived in Bombay from the U.S. The 115-ton vessel, M.V. *Judith*, with a quick-freezing capacity of four tons per day and additional cold storage space for about 70 tons of fish, has been commissioned by an Indo-American venture, of which the Indian partners are Tata's Investment Corporation.

The new vessel will move from port to port along the west coast, collecting and freezing fish. The main catch will be shrimp for which the U.S. will provide the major market. The *Judith* will also deliver its cargo of frozen fish directly to ocean-going vessels destined for foreign parts. In some cases, however, the frozen fish will be unloaded at freezing and cold storage plants operated by the company.

Queen Juliana of the Netherlands visiting the essence and perfumery factories of Polak and Schwarz at Zaandam. She is seen here, in company with her lady-in-waiting, listening to Mr. A. Schwarz, director of the company. On the left is Mr. C. C. Brummer, another director of the company.

U.S. distillers to make Scotch

Schenley Industries, the large U.S. distilling company, aims to enter the world market for Scotch whisky by expanding Seager Evans and Co., of London, control of which it obtained last year.

Mr. L. S. Rosenstiel, chairman and president of Schenley, told a Press conference his organisation was authorising a large expansion programme for its new grain whisky distillery at Strathclyde and at its Glenugie malt whisky factory, and was almost ready to begin building two new malting distilleries in Morayshire, Scotland.

The two distilleries already under construction would produce about 150,000 British proof gal. of Scotch whisky a year, Mr. Rosenstiel said.

In addition, he said, the former Seager company's London grain distillery had been enlarged to twice its former capacity and would possibly be further enlarged.

He said his company's purpose was "to enter the world market and establish a world trade."

Schenley's also hoped to go into the gin business with English gins from the company's London distilleries.

Spanish refrigeration congress

The Spanish Experimental Low Temperature Centre is to hold its second general assembly at Vigo from November 4 to 9. Apart from papers and discussions from Spanish and other contributors there will be a series of visits to the most important freezing plants in Galicia.

Lard shortenings more popular

Lard is becoming more popular as a shortening agent in the U.S.A. Figures issued by the U.S. Department of Agriculture showed that 403 million lb. of lard were used in shortening during 1956 compared to 291 million lb. a year earlier.

Much of this renewed popularity is attributed to Proctor and Gamble's product *Fluffo* produced by a directed interesterification process in which the triglycerides are rearranged and at the same time removed from the reaction by crystallisation. The process has been in commercial use for about two years.

Hydrogenated vegetable oil has been considered superior to lard in shortenings for about 30 years. However, since *Fluffo* came on the market in 1955 its sales have been second only to *Crisco* all-vegetable-oil shortening, also made by Proctor and Gamble and claimed to be America's largest selling shortening.

Norwegian food subsidies

The Norwegian Government has decided to subsidise margarine and sugar in order to avoid an increase in the price of these commodities.

Brewery to make mineral waters

Carlsberg Brewery is said to have a development plan to the value of Kr. 50 m. (about £2½ m.), which includes a new mineral water factory alongside the brewery.

Aluminium v. tinplate

Aluminium cans are being developed by at least two large American manufacturers, Kaiser Aluminium and Chemical Corporation and Victor Metal Products Corporation. Other companies are reported to be working in the same direction.

Cans of this type would compete with tinplate in a number of markets. Food processing and brewing are expected to become the most important customers and Kaiser is said to have already an order for 5½ million aluminium cans from a large food manufacturer.

The main advantage of aluminium is that new processes have been developed which will enable the cans to be made more cheaply. However, the large U.S. container manufacturers, such as the American Can Co., and the Continental Can Co., are noticeably less enthusiastic about the prospects of aluminium cans and, in fact, American Can has just announced a new process by which the rate of output of standard cans may be increased and production costs lowered.

"Embalming preparation" for meat

A German biologist in South West Africa, Mr. Arno Eikmann, claims that he has discovered a preparation which will keep meat fresh without refrigeration indefinitely, according to our South African correspondent. Mr. Eikmann said in Windhoek that he believed his preparation, which he calls *Arcanum*, and which is made from herbs, may be similar to that used by ancient Egyptians for embalming mummies. Early in April he gave two pieces of fish to the Administrator of South West Africa, and it is said that after a month the fish was still fresh. A polony treated with *Arcanum* was hung in the sun for a week and then seemed quite fresh when eaten. Fresh meat is painted with the liquid and kept covered for 30 min. After a time it becomes dry, but after soaking in water for 24 hr. it is claimed to be as good as new. Mr. Eikmann says that he has been approached by the Argentine authorities, who want to test his discovery.

Technical Press Review

JULY

Dairy Engineering.—Frozen Milk by Ultrasonics; Revised Ideas on Bottle-Washing Detergents; Instruments in the Dairy; The Dairy Industry in Czechoslovakia; British Butter Factory Beats World Production Record; Report of N.D.A. Conference at Torquay.

World Crops.—Conservation of Grain in Britain; Improving the F.A.O. Wheat Sample; Wheat Quality; Control of Rats and Mice in Grain Storage; Hazards of Grain Dust.

Manufacturing Chemist. — Physiological and Chemical Properties of Insulin; Preparation of Monofluoracetates; Glycerin in Adhesives; Synthetic Analgesics and Antagonists, 3; Progress Reports: Therapeutics; Cosmetics; Pest Control Chemicals.

Atomics.—Engineering Problems of Nuclear Power, 3; Coolant Gas Circuits; Reactor Calculations; Dounreay's fast reactor; Dounreay's Materials Testing Reactor; The Chemical Group at Dounreay; A New Type of Atom-Smasher; Atomic Progress in Czechoslovakia; The Future of Nuclear Power; Canada's Uranium Prospect; "Canned" Motor Pumps.

Petroleum.—Planning an Electric Computer System; The Oil and Natural Gas Industry in Pakistan; Hydrogen Treating in the Refinery, 1; Exporting Equipment for the Oil Industry.

Automation Progress.—Control of Index Conveyors; Flow Production and Die Castings; Design and Use of Hydraulic Servo Systems; Control of Skip Winding in Colleries; High Speed Electronic Reproduction; Automatic Data Reduction; Electronic Controls for Industry; More Instruments and Electronics for Automation.

Chemical and Process Engineering.—New Applications of Plastics in Chemical Plant; Thermoplastics and Chemical Plant; Chemical Engineering Review; Mixing; Principles of Refining Lubricating Oil, 1; Heat Transfer in Spiral Tubes.

Corrosion Technology. — Corrosion Problems in a Blast Furnace Water Cooling System; The Role of Corrosion Inhibitors in Water Treatment; Prevention of Corrosion by Water Treatment; Corrosion in Boiler Fireboxes; Corrosion Research Laboratories, 12; Ministry of Supply Outdoor Paint Exposure Station.

For specimen copies write to Stratford House, Eden Street, London, N.W.1.

Overseas Enquiries

Bahamas: Packaged tea

Nassau Agencies, Ltd., P.O. Box 14, Nassau, wish to obtain a U.K. agency for the Bahamas for packaged tea (2 oz. to 1 lb.).

Nassau Agencies, Ltd. are manufacturers' representatives. Their principals include three well-known British companies and a number of prominent U.S. manufacturers. Tea would fit in well with the lines they already handle. They are considered to be a suitable connection for United Kingdom firms.

Suppliers interested in this agency enquiry should write direct to Nassau Agencies, Ltd.

Canada: Shortening

Kennedy Agencies, 13 North Wharf, Saint John, New Brunswick, are seeking a source of supply in the U.K. for shortening.

The Canadian firm state that if a United Kingdom firm could supply them with pure vegetable shortening (shortening with whale oil is not acceptable) in 400 to 600 lb. steel drums (this type of container is necessary because most of the bakeries are large operators) that they could sell something between 100 and 200 drums per month.

Those interested should write direct to Kennedy Agencies. Prices should be quoted c.i.f. East Coast Canadian port in Canadian dollars. Responding firms should notify the U.K. Trade Commissioner for the Atlantic Provinces, 65 Spring Garden Road, Halifax, Nova Scotia, of action taken.

Pakistan: Fish meal machinery

Mr. M. Yamin Qureshi, Deputy Secretary, Ministry of Agriculture, Block 79, Secretariat, Government of Pakistan, Karachi, would like to purchase fish meal machinery and canning and cold storage plant from the U.K. He would be interested in receiving all relevant literature, prices, etc. Twenty acres of land has been purchased for the factory under the Karachi Fish Harbour scheme, which is government sponsored.

Interested manufacturers should write direct to Mr. Qureshi.

Pakistan: Bakery and biscuit making machinery

The Ahmed Bakery, Sylhet, Pakistan, is interested in quotations and literature for bakery and biscuit making machinery. The firm is new in this business. Power is A.C. 400 volt. Bakery machinery should be for loaves from ½ to 2 lb. in weight. The firm have been issued an import licence for Rs. 10,000 during the current shipping period. Manufacturers interested in this enquiry should write direct to Ahmed Bakery.

Packaging

Condensed milk in tubes

Condensed milk in collapsible tubes has been introduced by the Nestle Co., Ltd., to the U.K. market. The 4-oz. tube, made in aluminium by Universal Metal Products, Ltd., is printed in two shades of blue on a white ground presenting an attractive and a hygienic pack which retails at 1s. 6d. The milk is exactly the same as the canned variety and contains over 10% butter fat. It is prepared solely from fresh milk and cane sugar.

To ensure freedom from contamination, the nozzle of the tube is closed with the U.M.P. *Oriseal*. To keep the tube seepage-proof after this seal has been removed, it has a U.M.P. patented wadless closure.

The tubes are filled at the Nestle factory at Dunragit, Scotland. They are individually cartoned, packed 12 to a display carton which are in turn packed four to a case.

Multi-unit soup pack

H. J. Heinz Co., Ltd., have introduced a multi-unit pack containing 6 cans of different varieties in a neat carrier sleeve to meet the demand they reckon already exists and is likely to grow for buying in half-dozens. Suppliers of the sleeves are Boxfoldia, Ltd. The cans are held in position by slots on the side panels and tongues on the lid. Thumb and finger holes provide for easy carrying. For strength, a stout Kraft board has been used with a coated paper lining giving a brilliantly white and glossy surface for printing the Heinz well-known one-colour design in red.

The National Canners Association in America reported that in 1956 they undertook an experimental survey in selected super-markets in the American Stores in Philadelphia and found that when 3 cans and 6 cans multi-packs were available on grocers' shelves as well as single cans, sales were 27% and 31% respectively above those of the normal single can shelf stocking method.

Boxfoldia, Ltd., have investigated automatic packing, and have information on American packing machines, some available on lease and some for out-right sale, which wrap the sleeve round the cans and lock without glueing.

This pack carries 6 different tins of Heinz' soups.

Transparent films

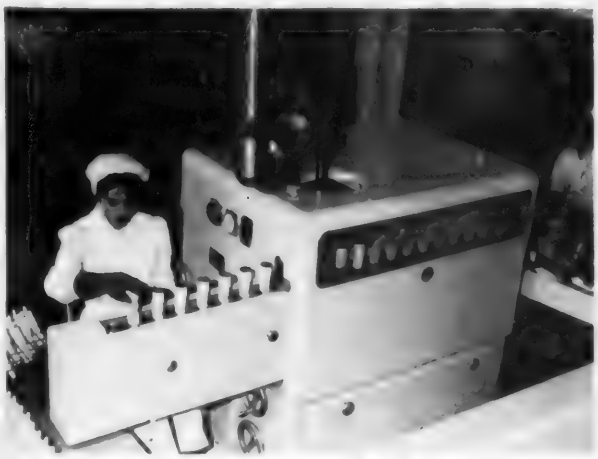
Three new and improved types of transparent food packaging film have been marketed by three leading packaging manufacturers.

Metathene, a cellulose film coated with *Diothene* polythene, is the latest addition to Metal Box's range of packaging materials. Described as exceptionally strong, transparent and stable, the material is welded together by heat sealing so that the seal is liquid and tight. Its vacuum-holding properties are claimed to make it suitable for vacuum packaging certain products including food where an increased shelf life can be expected over considerable temperature variations. Liquids, powders, and hardware are other products for which it may be suitable. *Metathene* can be supplied in pockets or reels and can be handled on a wide range of automatic forming and filling machines.

Another type of transparent, polythene-coated cellulose film, also said to be suitable for vacuum packing, has been produced by British Cellophane, Ltd. It is made by coating *Cellophane* on one side with polythene, by means of direct extrusion. No adhesive or other separate bonding agent is involved and the final product is not, strictly speaking, a laminate — the word sometimes applied to this type of film in the U.S. The combination of printing and handling properties of cellulose film with polythene's high tear-strength and resistance to chemicals and liquids is claimed to give a packaging medium suitable for many foodstuffs and manufactured products not usually sold in flexible, transparent films. The polythene-coated film also gives good protection against the passage of water-vapour, the actual permeability depending on the thickness of the polythene coating and the type of cellulose film.

Among the suggested uses of polythene-coated cellulose film are: the packaging of pastes and liquids, including shampoos, pickled foods, liquid coffee, disinfectants and insecticides; metals (including cutlery), heavy textiles, potting soil and compost and other bulky articles; chemicals and

The latest in Smedley's range of canned goods is a 1 lb. steak pudding retailing at 2s. 6d. The outstanding design of the label features a full colour reproduction of the pudding on a white band separating two strips of close patterned Cambridge blue. (Trade price is 25s. per doz.)



Left: **Filling tubes with condensed milk.** *Right;* **The new tube made for Nestles by U.M.P.**

pharmaceutical products, including strip-packaged tablets; quick-frozen meat, fruit, vegetables and fruit juices; and for the gas- and vacuum-packaging of cheese, bacon and other foodstuffs. At present a limited supply of four types of this film are available.

Hypak polythene packaging developed by the Oppenheimer Casing Co. (U.K.), Ltd., has been subjected to rigorous tests. It has been used for containers for food and delicate scientific and photographic equipment, for scientific expeditions and is said to have remained water-proof and dust-proof even in the most rigorous jungle conditions.

The Cambridge North Borneo expedition was equipped with a range of these containers, which were used for storing the bird and animal skins once they had been treated, for keeping clothing and photographic equipment dry and for preserving all types of equipment from the attacks of tropical rain and humidity.

Tape dispensers

A new, fully automatic dispenser for self-adhesive labels has been put upon the market by John Gosheron and Co., Ltd. It is electrically operated and is designed to speed the dispensation of *Tickotab* self-adhesive labels of varying sizes. It incorporates a variable speed mechanism geared to assembly line and batch work procedure.

A semi-automatic tape dispenser, the *Transotaper*, is also supplied by this company, at the moment for supplying tape to cylindrical containers only. It is claimed to handle cans of from 2⅞ in. to 6½ in. in diameter at an output of from 30 to 40 cans per min. The machine costs £325.

Patra extensions

Modern colour schemes and special dust-resisting concrete floors will be features of the new extension to the Leatherhead laboratories of the Printing, Packaging and Allied Trades Research Association. The extension, which is to be 50 ft. behind the present building, will be 150 ft. long × 50 ft. wide. It has been designed and positioned in such a manner so as to facilitate the addition of other buildings.

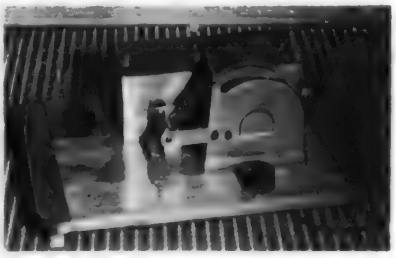
All the packaging department, the workshop and staff-room will be accommodated and as the packaging laboratories will have an extra 1,800 sq. ft. of space this will mean that additional equipment can be bought.

Unloading heavy equipment and parcels will be made much easier by the provision of a fork-stacking truck which will take loads of up to ¼ ton. A large door at one end of the building opening on to the service road gives easy access to the packaging laboratories.

Provision has also been made for larger humidity rooms and darkrooms. An interesting feature of the package testing department will be a spray-room where it will be possible to conduct shower tests.

The staff-room will be much larger than the one in the present building and the room will be available for evening meetings.

Mono Containers' new 9 oz. hot drink cup. Slogans, such as the above, and advertising material can be easily printed on the cups.



Electrically operated dispenser for "Tickotab" self-adhesive labels. It is fully automatic and incorporates a variable speed mechanism.

Flexile collapsible metal tubes fitted with a membrane seal. This is pierced by the spike of the cap, which is used for subsequent closing.

Ink for P.V.C.

A marking ink for P.V.C. called *Springlak* has been developed by Swale Chemicals, Ltd., which, they say, has high covering power and quick air-drying properties—15 sec. at a minimum weight of covering. The product is available in a range of light fast colours and prices range from 30s. to 60s. per gal.

The company investigates unusual problems in either hand or mechanical applications.

Decade of "Diophane"

Although Transparent Paper, Ltd., has been in operation since 1928, it is during the past ten years that its most outstanding developments, *i.e.* the expansion of the factory to produce the present quantities of *Diophane* cellulose film, have taken place. The company has now issued a progress report (1946-56) which tells the story of these ten years. It has been distributed to their shareholders.

The booklet tells how Transparent Paper have been able to print up to six and seven colours. It also indicates the extent to which working conditions in the plant have been improved and the care given since the war to the welfare of their employees.

A foreword by the chairman, Sir Richard Pease, points out that the prices of his company's products have risen only once during the past ten years which was five years ago.

Membrane seal

For products which tend to seep, Flexile Metal Co., Ltd., has developed a method of hermetic sealing collapsible tubes. The nozzle of the tube is sealed by a membrane while the folded end is rendered air- and liquid-tight by means of a latex end sealing compound. The membrane nozzle seal, which is available on aluminium, tin, tin-coated lead and lead tubes, is a film of metal approximately 3 thousandths of an inch in thickness which is integral with the metal of the tube and seals the nozzle completely, preventing evaporation or seepage. The tube is fitted with a *Polyflex* polythene cap with a spike on the top. To open the tube, the cap is removed and the nozzle is pierced by reversing the cap and pressing the spike into the membrane top. The polythene cap is then replaced and gives adequate sealing during the rest of the life of the tube.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post. Enquiries cannot be answered by telephone.

Composition of self-raising flour

B.8223. *Can you give us any information on the composition of self-raising flour?* (Limassol, Cyprus)

The following information on the composition of self-raising flour is abstracted from *Food Industries Manual* (18th edn., 1957, Leonard Hill (Books), Ltd., 65s. net).

Self-raising flour is one in which has been incorporated sodium bicarbonate and a soluble acid substance in such proportions that, if they are permitted to react, they will yield sufficient carbon dioxide for aeration purposes without leaving a marked excess of either ingredient. Most self-raising flours contain 3¼ lb. of sodium bicarbonate per sack (280 lb.) and about 4¼ lb. of 80% acid calcium phosphate or of acid sodium pyrophosphate per sack. The latter is often used in a diluted form, in which event usually 6½ lb. are needed to provide the 4¼ lb. of the acid pyrophosphate required to neutralise 3¼ lb. of sodium bicarbonate. In some instances a mixture of acid calcium phosphate and of acid sodium pyrophosphate is used as the acid ingredient. The presence in the self-raising flour of 3¼ lb. of sodium bicarbonate per sack and sufficient acid body to neutralise this gives the flour an available carbon dioxide content of about 0·59%, which is well above the statutory minimum requirement of 0·40% and hence provides a good margin for loss during storage.

Packing liquid eggs

B.8217. *Have you any information on the packing of liquid eggs? We would like to know the most suitable container, the best method of packing and the correct storage temperatures.* (Co. Monaghan, Eire)

It is not clear whether you mean liquid egg or liquid egg that has been frozen. Liquid egg, as such, whether white or yolk or a mixture of the white and yolk, is a perishable commodity. A certain amount of liquid whole egg is prepared from cracked eggs in egg packing stations. This liquid is usually sold to and used promptly by local bakers and confectioners. It will keep better if the liquid immediately after preparation is cooled rapidly, preferably within 1 hr., to a temperature lower than 45°F., and is kept either at this temperature or preferably at 32°F. Even so, it should not be kept for more than two or three days. There is no standard form of packaging for this material, but clean tins would be suitable.

The various forms of frozen eggs are important articles of commerce. Practically all this material is packed in tins. In North America, tin pails containing 30 lb. material are most frequently used. The frozen egg imported into Gt. Britain is packed in oblong tins with a relatively small press-in lid (1½-2 in. in diameter) placed towards one corner of the top surface of the tin. There is a large variation in tin sizes: China sends tins containing 22 and 44 lb., Australia 28 lb., while with the material manufactured in the U.K., the size varies with the wishes of the buyer (a common size is 16 lb.).

The liquid, after preparation under strictly sanitary conditions, is placed in the tins and frozen rapidly in chambers maintained at −10°F. or lower and usually equipped with an air blast. In North America the frozen material is usually stored at 0°F., but in Britain it is stored at 15°F. Its storage life is usually at least 12 months.

Information supplied

The Enquiry Service has dealt with requests for names of manufacturers and suppliers of plant machinery and materials, and also general information as follows:

B.8106. *Equipment for producing icing sugar.* (Molento, S. Africa)

B.8107. *Uses of Californian raisins for chocolate dipping.* (Fresno, Calif., U.S.A.)

B.8108. *Contract grinding.* (London, S.W.10)

B.8109. *Growing mushrooms in sawdust.* (Umtali, Rhodesia)

B.8110. *Recipe for mint jelly.* (Inverness)

B.8111. *Makers of plastic trays.* (Dublin)

B.8112. *Recipe for dry mix for milk shakes.* (Hyde, Cheshire)

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B.8121. *Prepackaged fruit and vegetables.* (Sheffield)

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B.8136. *Making potato flour and dehydrated potatoes.* (Lappeenmaata, Finland)

B.8137. *Manufacturers of mill.* (Hatch End, Mdx.)

B.8138. *Legal position regarding antibiotics in food.* (Greenford, Mdx.)

B.8140. *Formulae for Turkish delight and marshmallow.* (Co. Waterford, Eire)

New Companies

E.C.S. (Northwood Hills), Ltd. (578126.) 9, Broadway Parade, Pinner Road, North Harrow, Middlesex. Bakers, confectioners, pastrycooks, etc. £100. Dirs.: D. I. Davis, R. G. Hardcastle and R. E. Cox.

Eaves (Bootle), Ltd. (578642.) 81, Peel Road, Liverpool, 20. Mfrs. and suppliers of sweets, chocolate and confectionery. £2,000. Dirs.: R. Eaves, F. J. Frodsham, C. S. Brown and Jean S. Brown.

F.P. Research, Ltd. (576020.) 19, Fenchurch Street, London, E.C.3. To carry out research into aspects of the production of foodstuffs, etc. £100. Dirs.: C. F. Windrow and M. Haddon-Grant.

Feeny and Matheson, Ltd. (578643.) 468, India Buildings, Water Street, Liverpool, 2. Growers and shippers of wines and spirits, wine and spirit merchants. £100. Subs.: G. Thomas and A. A. McKee.

Fylde Frozen Foods, Ltd. (579729.) Lawsons Road, Thornton, near Blackpool. £100. Dirs.: G. Stephenson and J. Reid.

E. C. and E. Gill, Ltd. (578066.) 2a, Northumberland Road, Lemington, Northumberland. Bakers and confectioners. £100. Dirs.: E. C. and Mrs. E. Gill.

F. Granelli and Sons, Ltd. ((580081.) 19-21, Middleford, Mabgate, Leeds, 9. Mfrs. of and dealers in ice cream, sweetmeats, confectionery, biscuit manufacturers, bakers, etc. £1,000. Dirs.: A., L. F. M. and Mrs. F. Granelli.

Gray and Sons (Brewers), Ltd. (579597.) 7, Springfield Road, Chelmsford, Essex. To take over business of a brewer, maltster, spirit merchant, etc., carried on at Chelmsford and elsewhere in Essex as "Gray and Sons." £97,400. Dirs.: T. R. and Mrs. M. E. Gray, J. D. C. Stone.

Green Bros. (Huntley), Ltd. (578294.) 4, Station Road, Gloucester. Biscuit mfrs., bakers, confectioners, etc. £2,000. Dirs.: C. H., Mrs. V., F. L., and Daisy Green.

Greenhalgh's Model Bakery, Ltd. (580014.) 55, Longworth Road, Horwich. £100. Dirs.: W. A. and Mrs. K. M. Smart.

Heald and Son, Ltd. (580002.) 56, Argyle Street, Birkenhead. Mfrs. of and dealers in sugar confectionery, chocolates, etc. £1,000. Dirs.: F. and Mrs. P. Heald.

Hitchen, Smith and Co., Ltd. (579193.) Spring Bank Confectionery Works, Manchester Road, Nelson, Lancs. Mfrs. of and dealers in confectionery, sweets, chocolates, ices, and cooked and prepared food. £3,000. Dirs.: I. L. and J. T. Smith, and T. Hitchen.

Horsfalls (Blackpool), Ltd. (578158.) 79, Market Street, Choley, Lancs. Mfrs. of and dealers in cooked and prepared meats, etc. £100. Dirs.: Margaret A. E. Kershaw, Eileen M. Howard and Yvonne T. C. Doherty.

Humberside Fisheries, Ltd. (579422.) 99, Princes Avenue, Hull. £1,500. Dirs.: J. W. Johnson and E. Clipson.

W. A. Humphrey (Engineers), Ltd. (579227.) 501, York Road, Wandsworth, London, S.W.18. Mfrs. of foodstuffs machinery, etc. £2,000. Dirs.: W. A. and E. A. H. Humphrey, L. H. Dowling.

Isle of Wight Egg Packing Station, Ltd. (578107.) 53, South Street, Newport, Isle of Wight. £200. Dirs.: A. D. Dockrill, S. A. Watson, G. B. Robinson, T. W. Glenny, E. P. Marven, D. F. Whitney and P. K. Wallis.

Kluman and Balter, Ltd. (578025.) 14, Robert Adam Street, London, W.1. Mfrs. of and dealers in bakers', confectioners', pastrycooks' and general caterers' raw materials and sundries, etc. £1,000. Dirs.: R. and T. Kluman, G. Balter.

Liverpool Freezing Co., Ltd. (578027.) 16, Wood Grove, Liverpool, 13. Butchers, etc. £500. Subs.: M. Caplan and P. H. Baker.

N. J. Mulder (U.K.), Ltd. (577628.) 70-71, Gracechurch Street, London, E.C.3. Importers and exporters of fresh, canned, dried and frozen fruit, vegetables and food of all kinds, etc. £10,000. Subs.: J. H. Thomlinson and J. T. Race.

Musgraves (Fish Supply), Ltd. (579606.) 341, Hessle Road, Hull. £1,000. Dirs.: F. C. Hudson and W. Perry.

Stone and Webber (Wholesale), Ltd. (568937.) Buyers and sellers and mchts. of meat; butchers, etc. £10,000. Dirs.: G. E. Stone, 57, Northwick Avenue, Kenton, Harrow, Mdx., J. W. B. and H. S. Stone.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

779,831. H. SCHRODER: Dough dividing and kneading machines.

779,604. A. A. HELLBAUM: Edible carbohydrates.

779,527. T. AND T. VICARS, LTD., and J. F. NAYLOR: Baking dough products.

779,742. PALMER MANN AND CO., LTD.: Crystallisation of salt.

779,947. CO-OPERATIVE WHOLESALE SOCIETY, LTD.: Bottles and bottle closures.

779,830. WOLFF UND CO. KOMM.-GES. AUK AKT.: Method of producing synthetic sausage casings.

779,560. ALLEN CHLOROPHYLL CO.: Canning of green vegetables.

779,768. HUNT PARTNERS, LTD.: Containers for fruit and other articles.

779,965. FARBENFABRIKEN BAYER A.G.: Growth-promoting feeding stuffs.

779,576. R. P. C. CARCASSONNE-LEDUC: Method and device for cooking and drying rice.

779,777. BAKER PERKINS, LTD.: Stripping apparatus for bakery ovens and like conveyors.

779,541. E. T. OAKES CORP.: Sandwich making machines.

777,211. IDEAL PACKAGINGS, LTD.: Packaging machines for packaging articles between layers of film material.

777,251. H. STRAHMANN: Processes and devices for the production of dough for bread and like baked products.

777,268. T. AND T. VICARS, LTD., J. EATON and R. A. COULSON: Handling of biscuits or like laminary articles.

777,089. B. S. BELLAMY: Fish-packing boxes.

H. SIMON, LTD.: Spout connectors for machines for processing and conveying granular materials.

777,358. J. W. TOMKINS: Machines for disintegrating vegetation.

777,205. MIKROVAERK AKTIESELSKAB: Conveyors for moulding plants for chocolate and similar mouldable masses.

Trade Marks

SUNNIMARK.—751,480. Non-alcoholic drinks and preparations for making such drinks. **The Lincolnshire Farmeries Co., Ltd.**, Riverside East, Brigg, Lincs.

SUNSTREAK.—754,876. Non-alcoholic drinks and preparations for making such drinks, and fruit juices. **Jewsbury and Brown, Ltd.**, 7, Ardwick Green North, Ardwick, Manchester.

TOFFINA.—754,954. Non-medicated confectionery. **A. S. Wilkin, Ltd.**, Cremona Park, Benton Road, Newcastle-on-Tyne.

TRUE LOVE.—749,168. Non-medicated confectionery. **Sweetule Products, Ltd.**, 33-35, Church Street, Radcliffe, Manchester.

UNIJEL.—755,415. Jellies for food; and preparations for making jelly for use with flour confectionery. **The United Yeast Co., Ltd.**, 171-174, Tottenham Court Road, London, W.1.

WAVENEY.—B751,770. Canned sweet puddings. **Co-operative Wholesale Society, Ltd.**, 1, Balloon Street, Manchester.

VILLAGE.—755,782. Canned fruits, dried fruits, dried and cooked peas, meat paste, fish paste, canned fish, suet, jams, marmalade, cheese, olive oil for food, desiccated coconut, butter, edible lard; and lentils, haricot beans and butter beans, all being preserved, dried or cooked, all being goods for sale in England, other than in Cumberland, Westmorland, Northumberland, Durham, Lancashire, Yorkshire, Cheshire and Lincolnshire. **Peter Keevil and Sons, Ltd.**, 370, Edgware Road, London, W.2.

FLEUR DE LYS.—761,279. Canned fish for sale in the U.K., and canned vegetables and edible oils. **Plantin Bros., Ltd.**, 6, Laurence Pountney Hill, London, E.C.4.

WOODLANDS VALE.—761,712. Fruit and vegetables, all being preserved, canned, bottled, dried or frozen. **Orpro Food Products, Ltd.**, Farm Road, Woodlands Park, Maidenhead, Berks.

CLOVERDALE. — B762,100. Canned meats. **John Loudon and Co., Ltd.**, 1, London Bridge, London, S.E.1.

FROND.—762,423. Dates. **Kinsale Trading, Ltd.**, 9-13, Fenchurch Buildings, Fenchurch Street, London, E.C.3.

SOUTHVILLE.—B763,183. Meat, fish, fruits and vegetables, all being canned goods. **Antonio Gonzalez, Ltd.**, Moorgate Hall, Moorgate, London, E.C.2.

"MEDOS."—763,430. Dried, preserved and prepacked fruits and prepacked vegetables. **Dennis John Cicilitira and John Nikolas Cicilitira**, 7-8, Idol Lane, London, E.C.3.

CABER.—763,530. Edible cream, condensed milk, butter and cheese. **Minsterley Creameries, Ltd.**, Minsterley, Shropshire.

SILVER BOUNTY.—764,135. Butter. **Adams (Wholesale) Dairies, Ltd.**, Buxton Road, Leek, Stafford.

ROCK'N ROLL.—757,855. Non-medicated confectionery. **A. and B.C. Chewing Gum, Ltd.**, 61, Oak Grove, Cricklewood, London, N.W.2.

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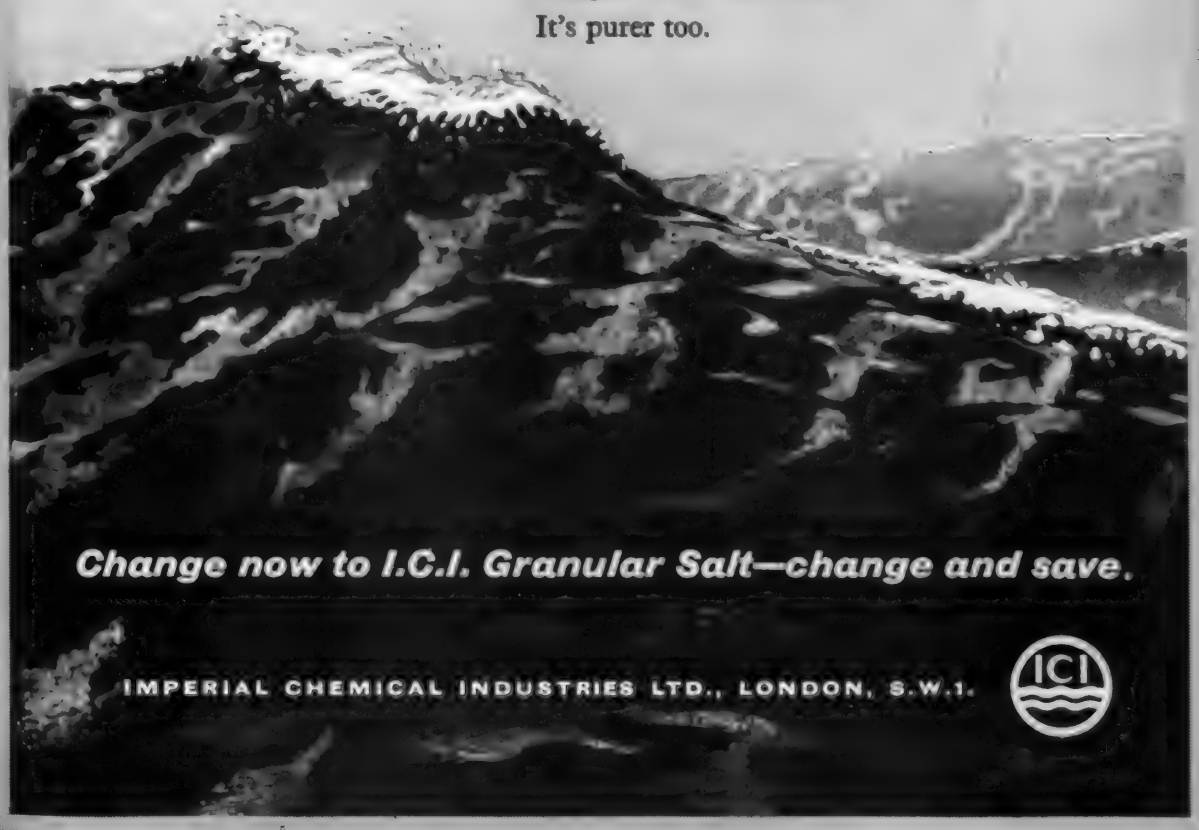

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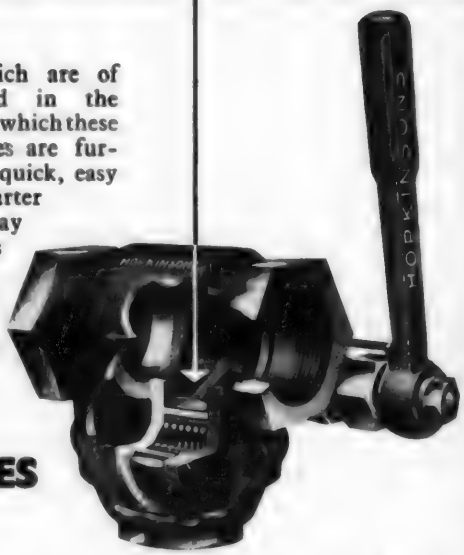

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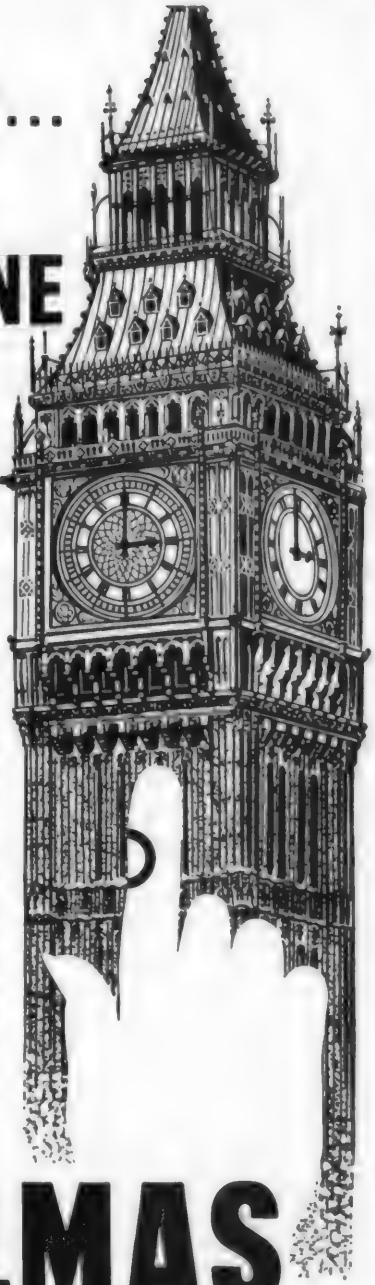

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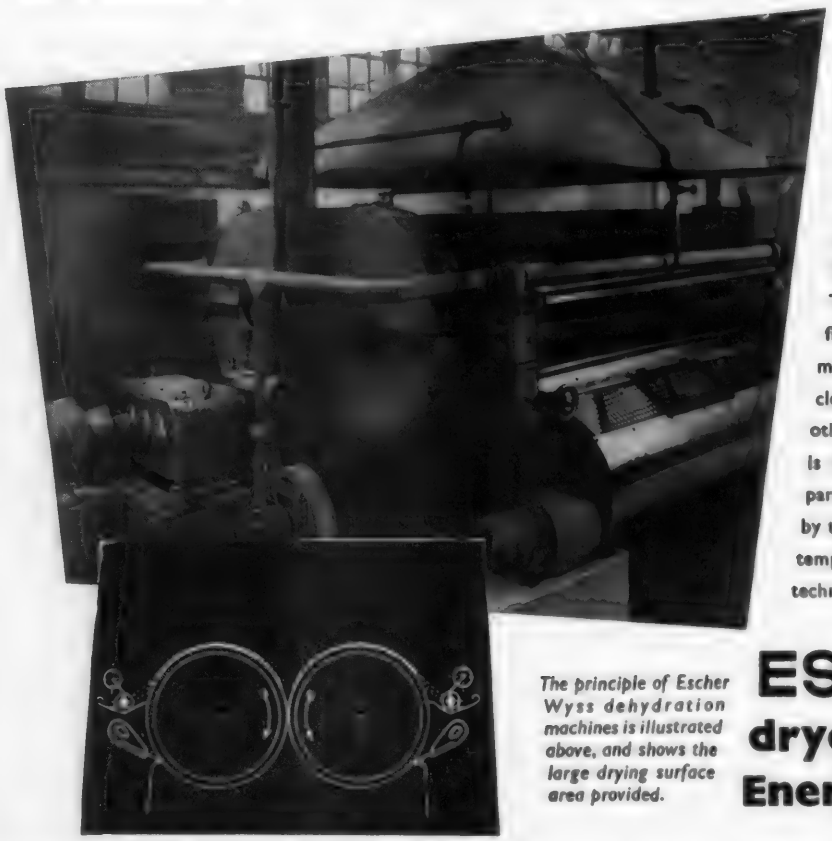

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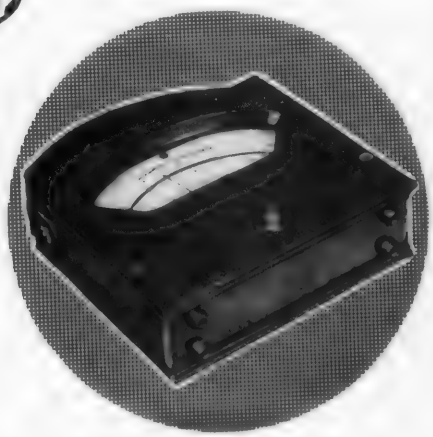

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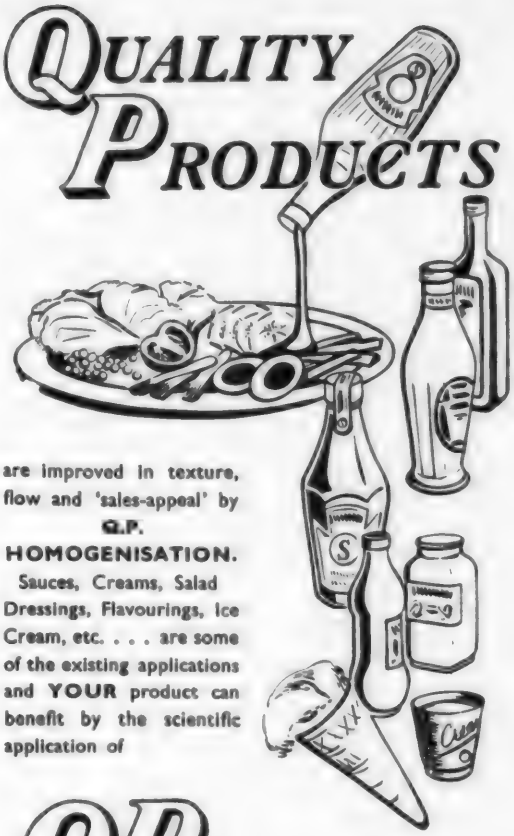

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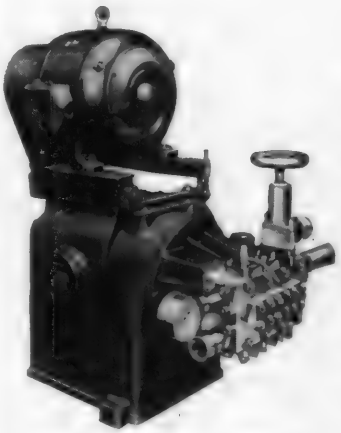

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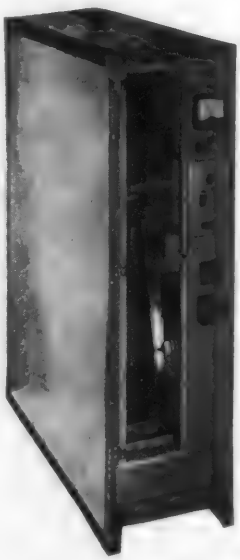

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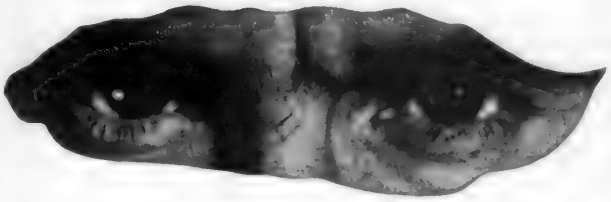

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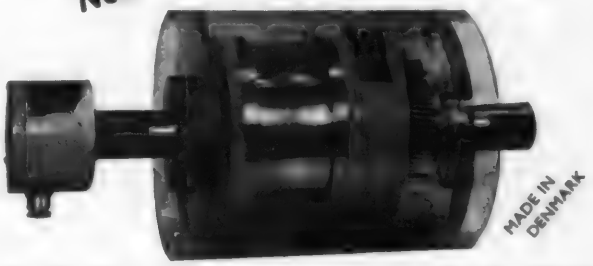

The illustration is of a transparent model to show the internal mechanism and Coolant oil bath.

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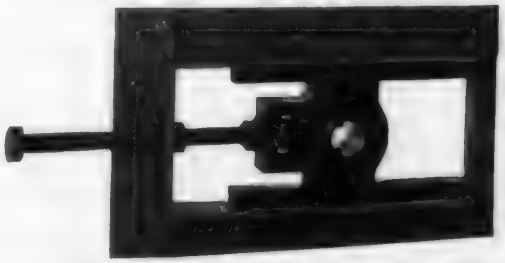

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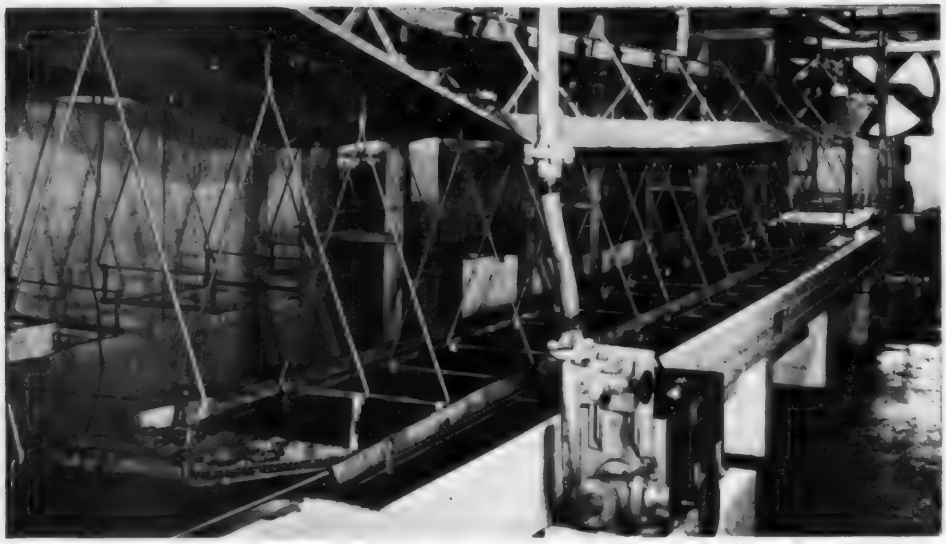

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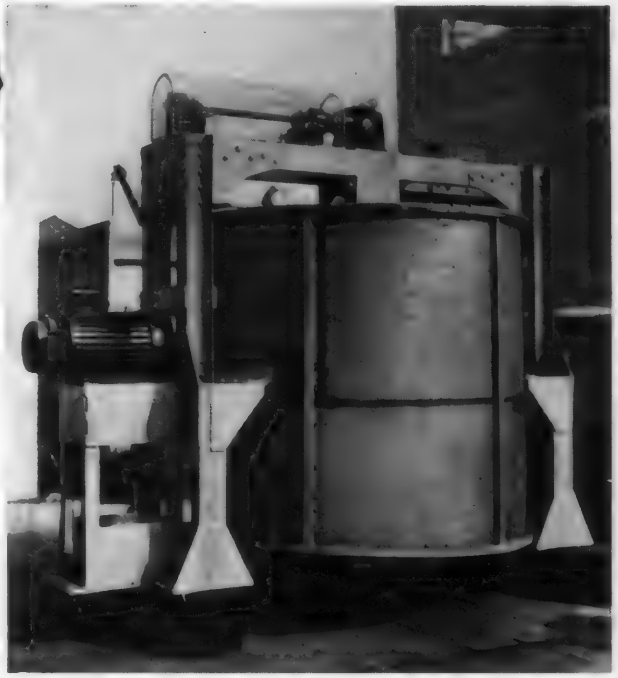

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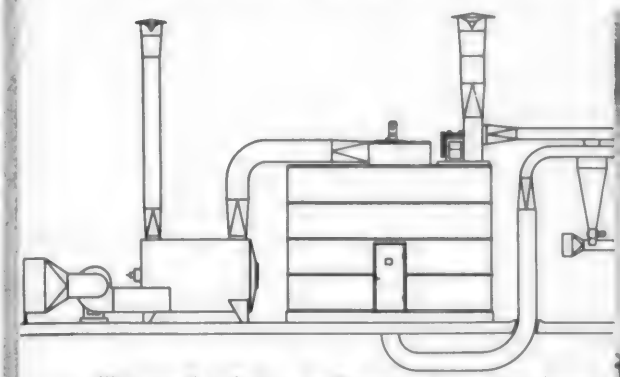

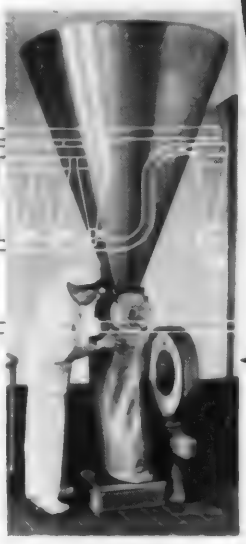

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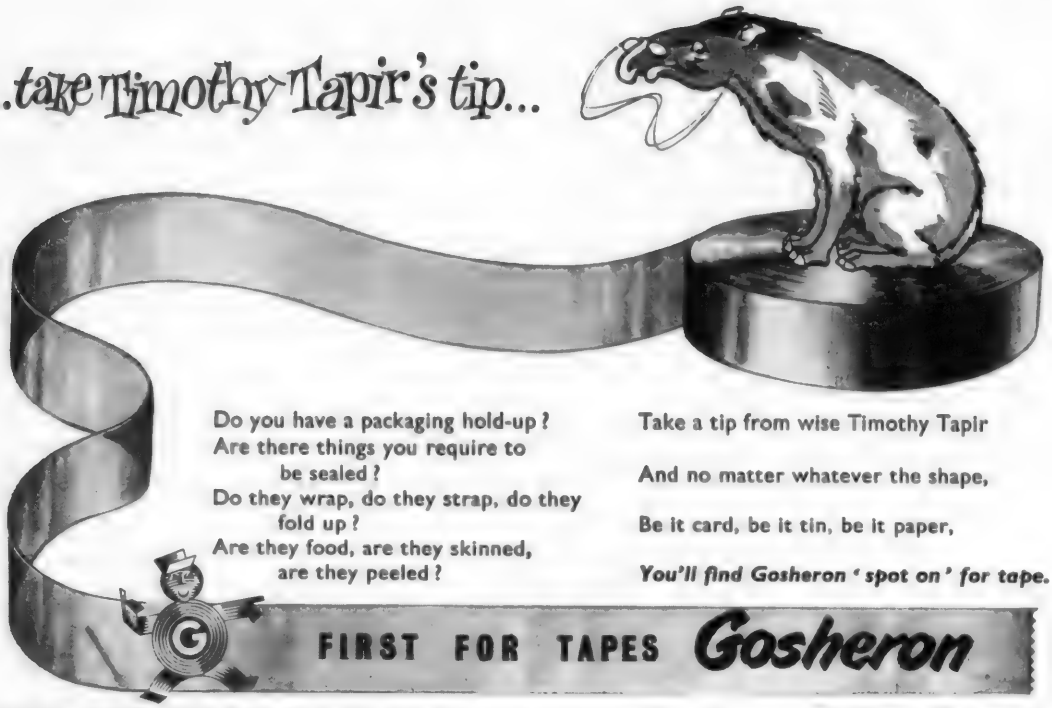

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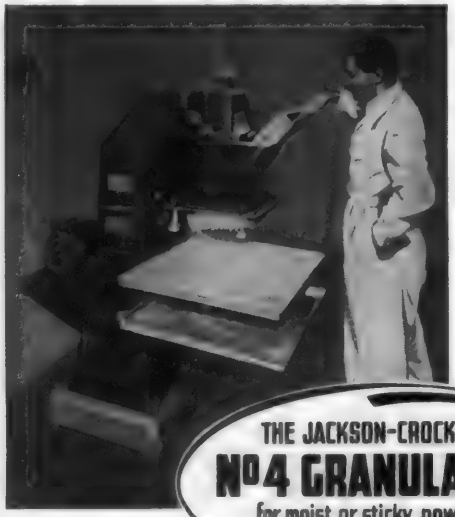

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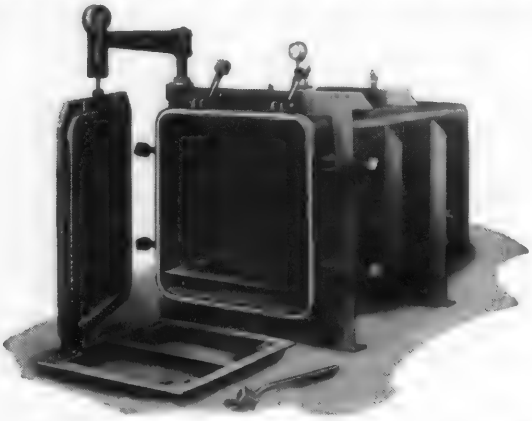

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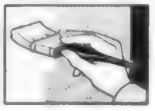

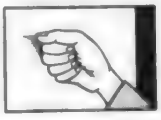

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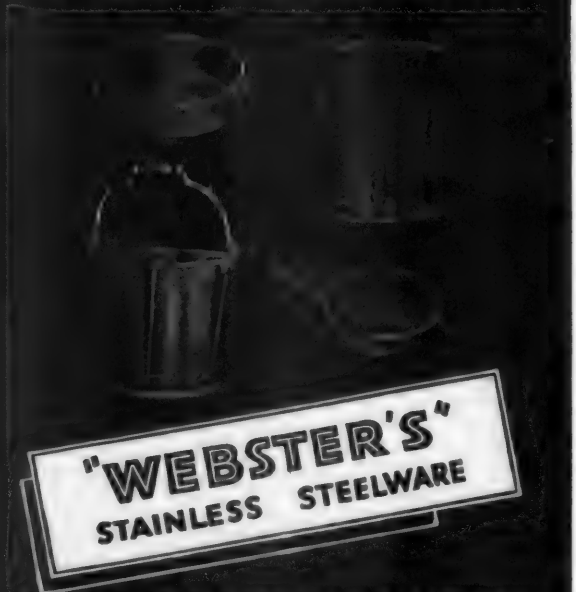

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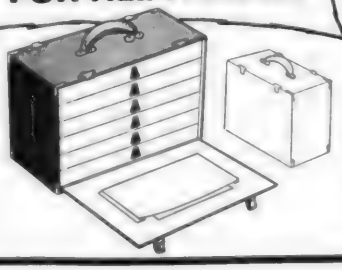

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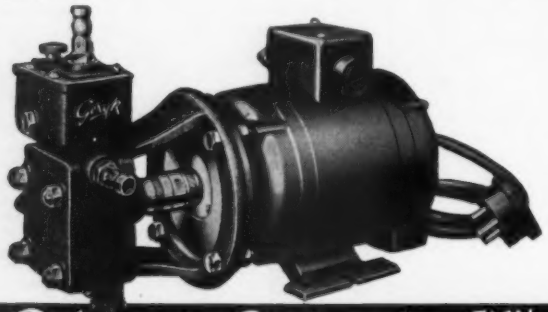

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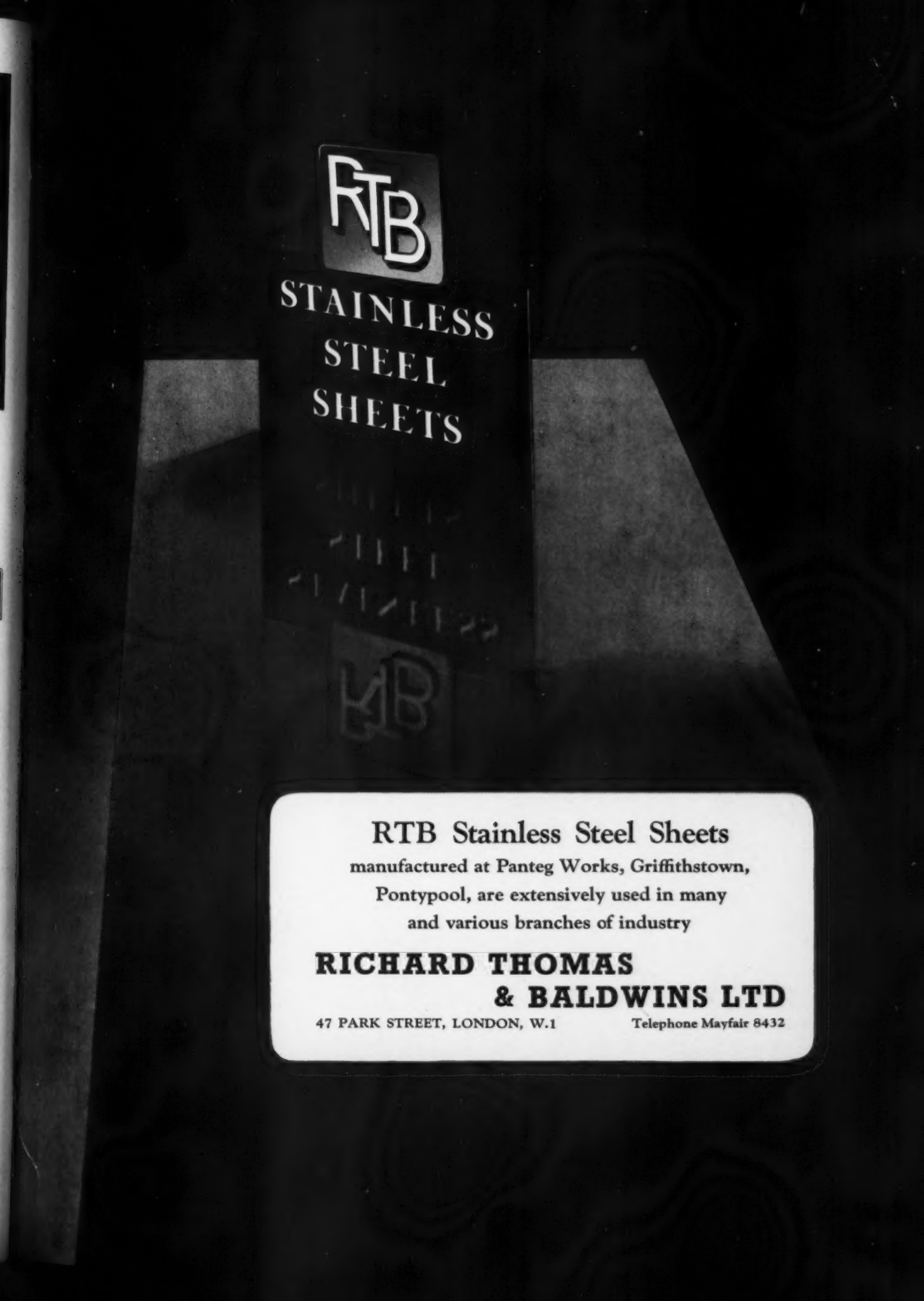

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